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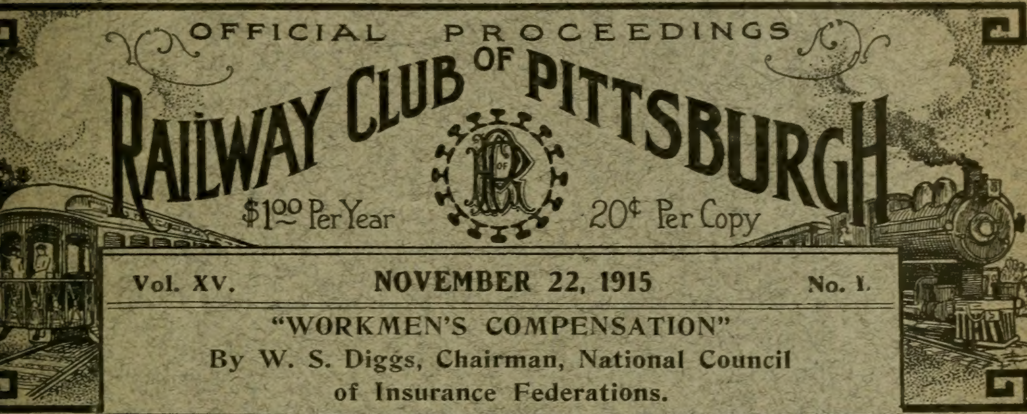

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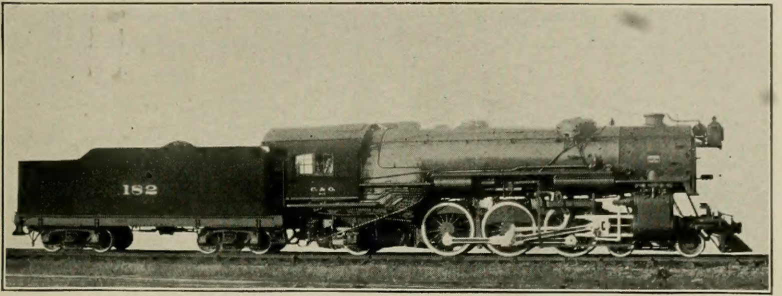

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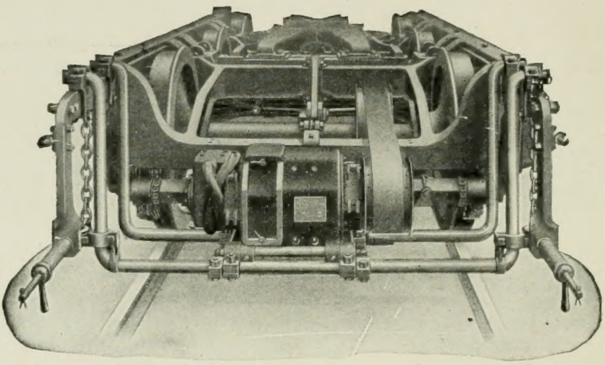

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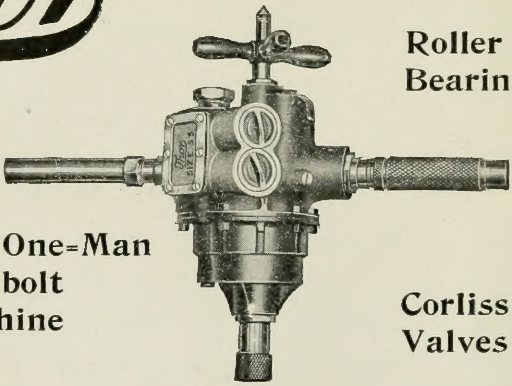

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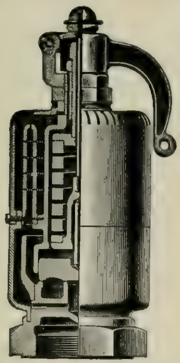

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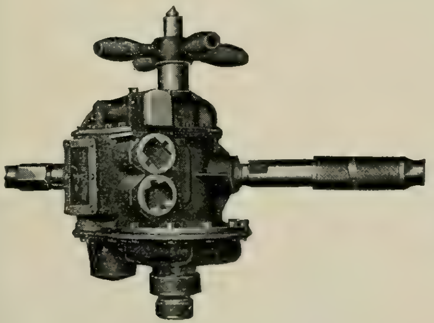

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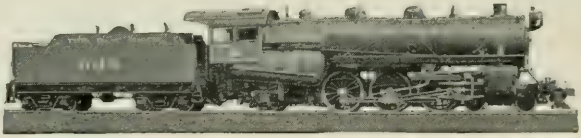

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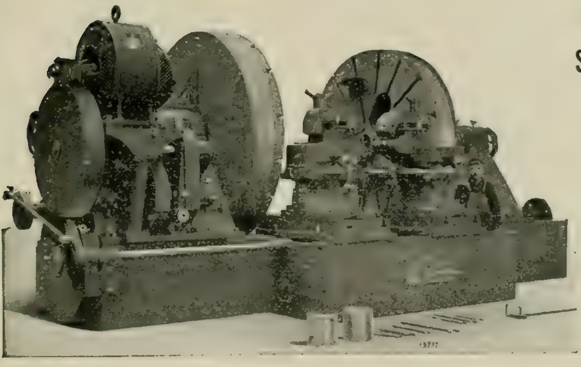

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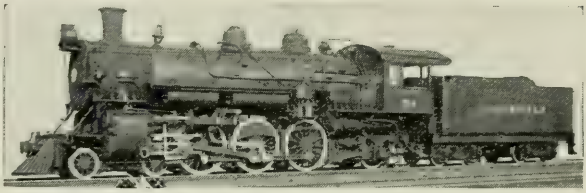

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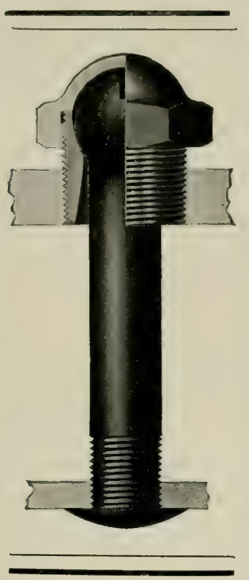

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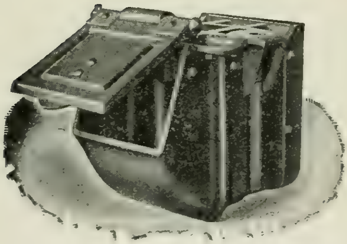

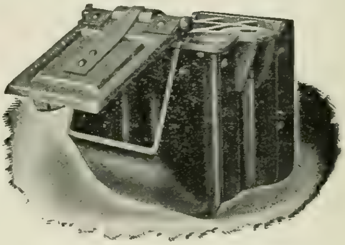

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* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

374368

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Maxfield, H. H.
Meigs, R. R.
Mitchell, A. G.
Mitchell, J. W.
McCaslin, A. W.
McCollum, G. C.
McDermitt, W. W.
McDonnell, F. V.
McGhee, W. S.
McKinstry, C. H.
Neel, T. M.
Newbury, E. H.
Newell, E. W.
O'Connor, M.
Painter, Jos.
Parke, F. H.
Patterson, J. E.
Pennington, F. W.
Pennepacker, N. W.
Perry, W. E.
Pie, J. J.
Ream, A. H.
Redding, D. J.
Richardson, L.
Richardson, W. P.
Riley, J. W.
Ritts, W. H.
Robbins, F. S.
Rowe, M. L.
Runser, K. W.
Sattley, E. C.
Schaich, W. L.
Scheck, H. G.
Shaner, E. L.
Shaw, H. D.
Sleeman, W. C.
Slutzker, Jos.
Smead, D. N.
Smith, D. W.
Smith, F. C.
Smith, J. H.
Smith, M. A.
Smoot, W. D.
Snyder, Joseph
Snyder, J. W.
Stark, F. H.
Stucki, A.
Suckfield, G. A.
Swope, B. M.
Thomas, E.
Thomas, J. H.
Trappe, W. C.
Travis, J. H.
Truax, W. E.
Turner, Walter V.
Walther, G. C.
Warne, J. C.
Wegener, H.
White, F. L.
Williams, A. G.
Williams, W. W.
Williamson, J. A.
Voigt, A. J.
Yohe, J. B.
Zortman, C. E.

VISITORS.

Ashton, H.
Bickel, J. A.
Bumgardner, C. W.
Canty, F. J.
Carlson, A. L.
Cattell, L. E.
Cooper, C. E.
Davis, H. R.
Diggs, W. S.
Dunn, T. J.
Dysart, C. W.
Ekis, E. I.
Elliot, B. L.
Fener, H. N.

Fincher, B. H.
Freeman, J. L.
Hacker, E.
Heckmon, C. J.
Hess, R. M.
Hewitt, E. E.
Hoover, F. M.
Hugus, A. S.
Inks, S. W.
Johnson, G. W.
Knuetter, Wm.
Kohl, H. J.
Lang, J. L.
Lowe, C. T.
Lydick, H. S.
Matthews, L. C.
Merscher, J.
Meyer, F. N.
Minnich, W. C. Dr.
Mitchell, J. Jr.
Montgomery, J. F.
Munro, George
Murphy, P. F.
Musgrove, J. H.
McCarthy, J. C.
McGhee, A.
McGhee, J. A.
McGhee, W.
McKee, D. L.
McKee, S. F.
Osterrieder, A. J.
Pearce, R. M.
Price, W. F.
Quinn, E. W.
Rebstock, J. B.
Ruff, P.
Sawyer, E. L.
Schanwecker, F. B.
Sheetz, E. S.
Short, L.
Simms, D. S.
Small, J. T.
Slater, A. H. Jr.
Smith, D. W.
Smythe, W. C.
Sneck, H.
Stall, Roy L.
Stenson, G. A.
Stevenson, R.
Tarr, C. W.
Taylor, J. A.
Wagner, E. A.
Wagber, R. T.
Wallgren, N. O.
Watkins, P. M.
Westlake, C. H.
White, A. A.
Winters, G. H.
Woozloy, D. E.
Wright, J. B.

The roll call was dispensed with, the attendance being recorded on the registry cards.

The reading of the minutes was dispensed with, they having been published and distributed.

The following applications for membership were read by the Secretary.

Brown, James, Manager, Watson Paint & Class Co., 101 West Ohio Street, N. S., Pittsburgh, Pa. Recommended by Harry Howe.

Daley, John P., Representative, Daley Bros., 803 Amity Street, Homestead, Pa. Recommended by W. B. Lansberry.

Eckstein, J. E., Rodman, Penna. R. R., 4737 Baum Blvd., Pittsburgh, Pa. Recommended by R. A. Klein.

Haverstick, P. W., Assistant Supervisor, Penna. R. R., P. O. Box 314, Oakmont, Pa. Recommended by R. A. Klein.

Heckmon, C. J., Draftsman, Spang, Chalfant Co., 3458 Perrysville Avenue, N. S., Pittsburgh, Pa. Recommended by W. H. Ritts.

Hoover, F. M., President, Hoover & Diggs Co., Benedum-Trees Building, 221 Fourth Avenue, Pittsburgh, Pa. Recommended by D. H. Amsbary.

Kaimakar, M. A., Chainman, Penna. R. R., 107 Colonial Apartment, Wilkinsburg, Pa. Recommended by R. A. Klein.

Knuetter, William, Mechanical Engineer, Carnegie Steel Co., 3271½ East Street, N. S., Pittsburgh, Pa. Recommended by F. L. White.

Lopp, Robert E., Signal Repairman, Penna. R. R., 525 Chalfont Street, Pittsburgh, Pa. Recommended by C. F. Adams.

Matchett, H. K., Cash Clerk, Penna. Lines West, 238 Grant Avenue, Bellevue, Pa. Recommended by John Proven.

Sawyer, E. L., Salesman, Homestead Realty Co., 143 East 8th Avenue, Homestead, Pa. Recommended by W. B. Lansberry.

Stall, Roy L., Division Passenger Agent, Penna. R. R., 212 Oliver Building, Pittsburgh, Pa. Recommended by D. M. Howe.

Welch, Samuel J., Superintendent, Pressed Steel Car Co., 11 Frazier Avenue, McKees Rocks, Pa. Recommended by Harry Howe.

Wagner, E. A., Treasurer, L. A. Burnett Co., 1803 Benedum-Trees Building, Pittsburgh, Pa. Recommended by A. M. Harsch.

VICE-PRESIDENT: When these applicants have been favorably passed upon by the Executive Committee, the gentlemen will become members, upon payment of dues, without further action.

We have a subject for discussion this evening which is of great interest not only to railroad men in all lines of the service but to every citizen of the Commonwealth. It is my pleasure to introduce Mr. W. S. Diggs, Chairman of the National Council of Insurance Federations, who will address you upon the subject of Workmen's Compensation.

"WORKMEN'S COMPENSATION"

By Mr. W. S. Diggs.

MR. W. S. DIGGS: Mr. President and Gentlemen of The Railway Club of Pittsburgh:—I am very glad to be with you on this occasion and greatly appreciate the honor of addressing you upon this important subject.

I must speak to you tonight, gentlemen, from the standpoint of an insurance man, from the standpoint of an insurance underwriter. The observations I shall make on the subject of workmen's compensation, will be some convictions I have after making something of a study of this great and important subject.

You know the insurance man is everywhere present. There are 250,000 licensed insurance men in the United States. I made this statement in an address at South Bend, Ind., last March and a prosperous looking business man said to me, "Mr. Diggs, I believe that is true, and that they nearly all live in South Bend and have all solicited me for business." In addition to the 250,000 licensed insurance agents in the United States we have 1,250,000 executives, employees, heads of departments, special agents and managers. We spend for all kinds of insurance protection in the United States almost $2,000,000,000 annually.

Having given you these facts and figures, I feel somewhat proud of my vocation. The insurance business is so important that it is now only second to your great business. In financial importance on land and sea the business of transportation is the greatest business in the world. Second to it is the business of insurance, and third—which used to be first—is the banking business. The business of insurance has a great influence upon the life of the nation, touching every home, ramifying to every line of business activity, in fact it is a great business and economic necessity. You could no more run the business of this country without insurance than you could run a watch without a mainspring. We conclude therefore that it is entitled to your most careful and thoughtful consideration.

It may be well, in view of the fact that I was introduced to you as Chairman of a national insurance organization, to state that this organization among other things has for its object the carrying out of a plan to have the workmen's compensation laws of the various states made uniform as far as possible, so that the employers of the various states will not be at a disadvantage, one with another.

In 1884 the first workmen's compensation law known to civilization became a fact in Germany, and since that time forty civilized nations have workmen's compensation laws in one form or another. Less than five years ago the first workmen's compensation law which stood the test of the courts was enacted in the United States, and now we have 32 states of the Union that have such laws, either in operation or will soon become operative.

I believe that it would be well for me to discuss for a few minutes our present Pennsylvania employers' liability law. Employers' liability came as a necessity. Years ago when the industries of this country needed fostering, when employer and employee were both vitally interested in having the employer thrive, so that he might make money out of his business, have it grow and develop, so that the employee might have steady and profitable employment, it became evident that something must be done to protect the industries of the country against the likelihood of large judgments that might grow out of disasters resulting from industrial accidents. Under conditions as they then existed, and exist even today in this state, the employer had three commonlaw defenses known as the assumption of risk, contributory negligence and the fellow servant rule. When a man entered into hazardous employment he received extra pay on account of the character of the employment, and he was supposed to assume to a large degree the extra hazard incident to that employment. When an employee contributed to his own injury he was held responsible for such contribution. If an employee was injured through the negligence of a fellow servant he could not recover from his employer. The employer had to be at fault and the employee without fault in order that recovery against the employer might be successful. Fundamentally the purpose of the employers' liability law was to protect the employer's business so that he might have credit, so that his business might successfully survive a disaster, and further so that damages might be paid to injured employees when the employer was actually at fault. The companies writing this kind of business, and it was welcomed by both employer and employee, were only liable when the employer was liable.

This condition continued until about thirteen years ago when the president of one of the largest casualty companies in the east suggested that we ought to have a workmen's compensation law known as a workingmen's accident insurance. As a result of his activity the form of protection known as workmen's collective insurance was instituted thirteen years ago, which was really workmen's compensation by agreement of the company writing it, the employer having a part in it, and the employees participating in it. But as this form of insurance contemplated paying specific benefits and for loss of time growing out of injuries without regard to fault, it naturally cost more money than the kind of insurance that simply responded in damages when there was some negligence on the part of the employer, he not being in a position to take advantage of the three common law defenses, and the employee being free from fault. From that day to this the companies and their representatives who have studied this great question in the light of human progress have advocated some advance move that would relieve us of the economic waste that has grown out of this class of business. As a result of all this we have in thirty-two states various laws passed, which form a crazy quilt, a regular patch work becaue of the incongruities and the inharmonies and the difficulties growing out of such a mixed condition of things. Many of the workmen's compensation laws are the outgrowth of some of the pet ideas of certain students of social questions; many are the outgrowth of a desire on the part of ambitious men to serve on industrial boards; while many other laws have come as the result of existing conditions. Quite naturally they lack uniformity and stability.

Workmen's compensation has reached such a state of development in this country that it must be recognized as not only a live and interesting issue but one that must be worked out on a proper basis so that it will be economically sound and sound in a business way as well. The demagogue and self seeker should be eliminated.

Accidents which happen because of the negligence of the employer, because his machinery is not properly protected, because the working place is not properly lighted, because of false economy on his part, should be paid by the employer as a legitimate penalty for him to pay by reason of such negligence and such failure to do his duty. It is the intention, and steps have been taken to that end, to bring about a state of affairs in the way of accident prevention so that there shall only be such accidents as are inherent to the employers business, such as are purely incident to the business in which employer and employee are engaged. That being the case the cost of caring for those who are injured or their dependents as a matter of course, should become a part of the overhead expense of the industry and should eventually be passed on to the consumer. That being the case it simplifies the matter of who shall bear the expense of this form of insurance.

In Pennsylvania we have a law that will become effective on January 1, 1916, which is very similar to the New York law. It is elective in its terms, excepting as to state and its subdivisions. An employer will automatically come under the terms of the Act as a matter of course if he simply holds still and does nothing.

If he desires to avoid coming under the provisions of the law it is incumbent upon him to take steps to reject it. If he does reject the provisions of the law he is in a precarious condition because he is deprived of the right to plead the three common law defenses, in case action is brought against him under what is known as common law.

Those who come under the terms of the law can select any one of four forms of insurance, or at least any one of four methods of carrying his protection, I do not call them all insurance. He can carry his own risk, by filing with the Industrial Board his financial statement and if they find him qualified to discharge the obligations which will be imposed upon him by this law through a long term of years, which under certain circumstances may extend as long as fifteen or sixteen years, he can carry his own insurance. Now I believe that self insurance is not insurance, it is a gamble, unless an employer has such a wide distribution of risk, and such a thing is possible only in extreme cases. It has none of the elements of the science of insurance.

The next form of insurance outlined in the law is the State

Fund. The state of Pennsylvania proposes to go into the insurance business and has appropriated $300,000 to bear the expense of establishing and carrying on this Fund for the first twelve months. Now I have no objections to any employer going into the state fund if he thinks that is the kind of insurance he should carry, but I feel that I would be remiss in my duty as a student of and speaker on this subject if I did not give you my convictions. In the first place I do not believe that so-called state fund insurance is insurance. It is impossible for a state fund, with its limited area and classification to apply to its business the scientific rules which really make insurance underwriting stable and successful. Three things are necessary to secure dependable insurance, Insurance that will bring the greatest amount of protection at the lowest average cost. The first in my judgment is capital, surplus and legal reserve, with suitable and adequate re-insurance facilities so that heavy losses growing out of disaster may be taken care of and the immense aggregation of assets will act as a shock absorber and pay quickly and promptly large obligations without impairing the insurance company. The next thing is wide distribution of risks. This second largest business of the nation is built on that foundation. And an insuring medium that is limited to the state can not secure the distribution of risk in the various classifications that will make it sound and dependable. And thirdly you must spread that liability over, not only the great aggregation of capital, surplus and reserve, and not only over great areas so as to secure extensive distribution of risk, but you must extend it over a long period of years, which not only adds to stability but helps lower the general level of rates. All of these are missing in State Funds. And I object to state funds because, notwithstanding the fact that the Industrial Boards and those in charge are honest and capable men, I do not believe that either the state or the nation has any right to go into any kind of business or enterprise that can be as well or better carried on by the individual or company.

I object to it because it is subject to political influences in spite of the honesty and the high standing of the men who conduct the affairs of these funds. They are subject to the influence of political expediency, which is a great danger in the case of state insurance funds. I am from Ohio and since the meeting of the next to the last legislature in the state of Ohio, and it is a mighty good state for an insurance man to *come from*, they passed a law intended to give the state a monopolistic state insurance fund. The Governor of the state, who was largely responsible for the law, appointed a Commission of unquestioned ability and honor. It was the ideal of many men in that state to supersede the old form of employers' liability which had been a disappointment and economically wasteful with a form of insurance that would be really welcome to every employer and employee. However some men undertook this job from selfish motives. The self-seeker was there and when it came to appointing men to look after the state fund over the state they failed to appoint underwriters. In the city of Cincinnati they appointed an under, but he was an undertaker. That is the way they did all over the state. They appointed the men who could roll up the best majority in their respective localities for the party that had foisted upon the state such an insurance propaganda.

I do not intend to go into the Ohio fund matter, but I just want to call your attention to the fact that the administration that was responsible for state insurance and superseding the business that had been carried on by several thousand citizens and taxpayers of the state, was itself superseded by another administration of an opposite party and when the present governor had gone into his administration more than five or six months he demanded the resignation of the entire Board and openly charged the three members with pernicious political activity. He really had the goods on them, and one member of the Board resigned. He was some underwriter, he previously taught physics in the Ohio State University. The other two are still serving though they are out of harmony with the present administration. I am not saying which side is wrong, but I do leave with you the fact that it has assumed a political aspect and assert that inefficiency and disappointment are the result.

A passing word as the expense of state funds. The New York legislature appropriated $500,000 to pay the expenses of that Fund the first year. At the end of three months it was exhausted and they had incurred $25,000 of obligations in addition. This is taken from the authematic and official record of the report of the Controllers of the State of New York and it is the only Fund out of seven or eight that are in existence that has been examined carefully and impartially. I wonder what would be disclosed if the rest of them could be examined and the real conditions brought to light. Pray tell me how long will $300,000 last in the state of Pennsylvania to look after the interests of this Fund, if $500,000 in the State of New York, with only a slightly increased industrial volume of business only lasted three months with $25,000 to boot? Why the governor criticised them for running a little unnecessary branch office in New York in addition to the one they had in Albany, which cost them $35,000 a year! There was an actuary in the state of New York, a great man and many people believed in the Fund because he advocated it thinking that he of all men was unselfish—and this report disclosed the fact that he had been paid $10,000 for about 60 to 90 days service! And then another thing they were doing to save dividends to stockholders and commissions to insurance agents was to buy some ink wells at $9.00 per ink well. Another thing they did to show the strict economy that characterized the work of that Commission, they bought office chairs for $51.25 per chair. Guardians of the people under state Funds!

But look here. The State is not back of the Funds. They are offering insurance, and up to the time they commence to do business and collect premiums they haven't a cent, not a farthing. And some of the subdivisions of the Fund both in the state of Washington where the first Fund was created, and in West Virginia, more recently were bankrupt when they needed the money the worst to take care of dependents of men who had lost their lives in coal mining and in powder mill disasters.

Now there is another objection I have. (You will notice I am not in favor of State Funds as I go along). They only cover disability growing out of accidents that deprive the industrial worker of the privilege of continuing in his job after the two weeks waiting period. If he is incapacitated beyond two weeks he is paid 50% of his wages under the Fund in this state, with a maximum of $10 and a minimum of $5 per week until he is able to return to work. If he is not incapacitated beyond two weeks he gets nothing but his doctor bill, for minor cases of surgical aid $25 and for the major operations up to $75. Now that covers loss of time and for specific injuries set forth in the law, such as the loss of an arm or leg, etc., for total or partial disability. The fundamental purpose of workmen's compensation then is to extend its protection for these two purposes. Whenever there is a liability beyond that the Fund does not cover it. For instance this case has often been cited. A horse in New York with the reputation of being cross bit off a part of the ear of its driver as he was passing by. He was unable to return to work in five days. They only reimbursed him to the extent of his surgeon's fee. He filed a claim for disfigurement and it was disallowed. It was appealed to the lower court and the judgment of the Board was affirmed. It was appealed to the New York Court of Appeals and Judge Scott said that workmen's compensation as covered by the Fund only applies to compensation benefits for loss of time and for specific injuries and does not cover a disfigurement of that kind. But he told them that inasmuch as the employer was at fault, having a cross horse that was unsafe, and that under certain conditions an action at common law would lie. Suit was instituted and it was stated a few weeks ago by a New York speaker before the Pittsburgh Chamber of Commerce that a judgment had been recovered for $11,000 in this case. In the case of the loss of a toe you would go limping all through life but you would simply be reimbursed for whatever time you lost from your duties in excess of two weeks. The state fund does not cover such a liability. The policy of a stock company; each form of liability.

This is true that if an employer goes into the state fund according to the law in this state and in New York also, the fact of his going into the state fund exonerates him from liability on account of industrial accident whether the fund would be solvent or not. It is the opinion of some eminent counsel, however, that the buyer of insurance would not be exonerated from liability in case the state fund was insolvent and the beneficiaries in case of death could not recover from the state, that there would be a liability on the part of the employer. And state fund advocates have spread abroad throughout this state a pamphlet, and the same thing appears in the newspapers, to the effect that if the employer went into the state fund and gave notice of an accident within seven days—this is fundamental—that he would be exonerated from liability and that they furnish the only form of insurance that would protect the employer's property from liability to a lien the same as taxes. That has been accepted as a fact by a great many employers, but it is not a fact. Section

317 of Article 3 of the law expressly provides to the contrary and tells exactly how when the amount of a loss has been determined a company can deposit the money to cover deferred payments and the proper receipt entered upon the Prothonotary's docket absolutely exonerates the employer from further liability. Therefore the insurance of a stock company will not only guarantee payments because of their stability, as there is no danger of insolvency if a good company is selected, but it will also protect the property of the employer from the danger of lien or cloud of any kind.

Now I want to discuss for a few moments the mutual form of insurance permitted under the law. Mutual insurance for fire purposes, has proven its worth, because the amount of the loss from a fire under a mutual insurance contract is determined either within the year for which the insurance contract was written or soon thereafter so that the subscriber to a mutual association will soon know whether he gets a dividend or whether he has to reach down into his pocket and make up for an insufficient premium charge, therefore there is not the long drawn out liability. But in workmen's compensation it is a different proposition. The liability may extend out over a period of years, possibly as long as sixteen years or fifteen years after a mutual insurance contract has expired. And if there is an obligation beyond the available funds in the hands of a mutual company the responsible men of the mutual association would be tied up on account of these long deferred obligations for a long period of years. And in case of the death of the member of the mutual association it might prevent the settlement of his sestate or if he wanted to retire from business or make some change in his business they would have to keep the business organization alive until all these obligations were discharged. For these reasons I think the mutual insurance for compensation purposes is clouded with too much doubt.

Now the last but by no means the least form of insurance provided is stock company insurance. I believe that properly compensating the injured employee and properly protecting the employer is of sufficient importance that the employer should use judgment, as good judgment in buying that form of protection as he would use in any other important business transaction. Insurance companies organized for the purpose with their skilled and trained men and force of inspectors and their claim departments, who are in a position to preserve that delicate relation always existing between the employer and the employee, is the kind of insurance that I advocate. It is the kind of insurance that will make sure. I believe the time has come in the workmen's compensation business in this country that we will have to look out for stable insurance, insurance that will mean what it says and say what it means. And every policy issued by a standard stock insurance company has a clause in it guaranteeing all of the benefits and all of the provisions in the workmen's compensation law, and in addition to that it has in it what is called a common law paragraph, which is a standard form, which takes the place of the employer if your insurance for some reason or other does not cover under the compensation clause of your insurance contract. The employer is protected from every form and kind of accident, if the law is defective in some respect, if it is declared unconstitutional either as a whole or in part, if for some reason it involves the federal law instead of the state law, if a coverage under the workmen's compensation law is not complete; and it has not been complete in all these states where we have workmen's compensation laws. Every contract with a stock insurance company will give you complete coverage as an employer and promptly pay the employee.

Now I must close. But I want to say in closing that there is one thing that has been manifest and paramount in the minds of the companies writing this class of business and that is to bring about accident prevention. Accident prevention is an absolute necessity. Year before last they started on a scientific basis. In thirteen states year before last they examined 20,000 plants involving pay rolls of $700,000,000 which resulted in the saving of premiums amounting to $2,000,000, but much more in life and limb and added greatly to the safety and efficiency of the various plants. Last year instead of 20,000 they examined 60,000 plants with expert engineers, involving pay rolls of $2,000,000,000, with 3,600,000 employees, resulting in a saving of $4,500,000 in premiums. Accident prevention is being standardized so that nothing but the accidents that are not preventible will occur, and thus it becomes a legitimate tax upon the enterprise employing the labor.

When you hear people talk about this form of insurance and that form of insurance you must remember that a time like this is a great harvest for the promoter, it is a rich harvest for the man who has a pet scheme out of which he expects to make good money and he derides stable insurance and this and that connected with the fixed and necessary forms of underwriting. In considering that I am reminded of a little verse which I picked up in Springfield, Ohio, some months ago and I think it illustrates this condition. When I read this I will close, and if you have any questions you would like to ask I will try to answer them. I want to say at this point that I deeply appreciate your attention. I have talked longer than I intended to talk. I have left unsaid some things I had in mind to say and I have said some things that I did not intend to say on this occasion but I appreciate very greatly the privilege of addressing you this evening.

A plate glass front is not a store
  A farm is not the land.
You may have instruments galore
  And still not have a band
Diplomas do not lawyers make
  A doctor's sign is not
The thing that cures the stomach ache
  Or cools the fever, hot.

DISCUSSION.

VICE-PRESIDENT: Ordinarily I should apologize for introducing an insurance man to anybody, but not tonight. I had to do it. Mr. Diggs has signified his willingness to answer questions or explain any features of this problem. The question is now open for discussion.

MR. A. STUCKI: Listening to Mr. Diggs reminded me that the government in Switzerland went into the insurance business and it was thought to be a great thing for the people. It was hard on the insurance companies because the government rates were cheaper. But not long ago I got a letter from over there describing the plight the government is in. The federal insurance proved to be a great loss to the government. But do not forget that it is not the government that pays the bill, it is the citizen who pays it in the end every time. I do not think politics are as strenuous or quite as severe over there, but I agree with Mr. Diggs that it is a political undertaking just the same.

VICE-PRESIDENT: Mr. Yohe, have you anything to offer on this subject?

MR. J. B. YOHE: I have nothing to add, except to express my very high appreciation of the address which we have just heard, and which I assume will be printed and distributed to the members of the Club. I believe very few of us, as yet, know very much about the new Compensation Act, although, of course, we have all no doubt been studying it more or less, and are beginning to gain a clearer insight into its provisions. I feel that we are all indebted to the speaker for adding to our fund of information on this important subject.

MR. E. C. SATTLEY: I would like to ask the speaker whether the executive officers of a corporation will be included in a pay roll under the compensation act, and if so, why?

MR. DIGGS: Some states have not included them in the pay roll; others have. My judgment is that they will be included in the pay roll in Pennsylvania if they are on a salary and working for the company and dependent on their salary for a livelihood. The relation of employer and employee exists notwithstanding the fact that they may be an officer of the company. In the ordinary pay roll their salary up to a specified amount, $1500 for each man, is included as a part of the pay roll upon which the premium is based. Does that answer your question?

MR. SATTLEY: The executives in some corporations own pretty near all the stock and under ordinary circumstances they are never included in the pay roll. The question is whether they would necessarily be covered under the new Act.

MR. DIGGS: As the writing of this business is to be supervised entirely by a Board composed of the Insurance Commissioner, the Treasurer of the State and a third man, they will no doubt promulgate rules that will regulate that and the law will be construed along that line. If an employer who owns nearly all the stock of a corporation wants to reject the act there is a way for him to do it, and as he nearly owns his Company he would not be in a very perilous position perhaps. But the average executive; secretary, assistant secretary, auditor, etc., and the employees down the line of a corporation will no doubt come under the terms of the law.

MR. E. M. COX: Do you know of a case where an employer has been thrown liable through the mutual company becoming defunct?

MR. DIGGS: You mean a mutual casualty company? The oldest mutual casualty association in the United States is only about two years and a half old and of course the experience has been very limited. The worst is yet to come. A mutual casualty company in Chicago recently suspended. I think one in Iowa did last fall. The history of such companies has been so limited that there is really no way of discussing their future except on the basis of the principles of underwriting involved.

MR. COX: I saw a newspaper clipping stating that some manufacturer in Akron, I believe, was compelled to put up a $90,000 bond on account of a mutual company suspending.

MR. DIGGS: To be absolutely fair, I think that was not a mutual casualty company. It was a mutual fire insurance assocjaion. A similar case happened in Indiana recently where 2400 men had to come to the front with a good sum of money on account of the failure of a mutual association, but that also was not a mutual casualty company.

If government insurance will not succeed in Switzerland and in Germany under the form of government of the character of those countries, it can not hope to succeed under our form of government. They will have only temporary success, in my judgment. The state insurance in the Empire of Germany has become so burdensome that future enterprise is right now being taxed to support the state insurance propaganda. It is one of the inevitable results of insurance, that the older the risks the heavier relatively the claims become and the more money you need, and that is why reserves along the plan of stock insurance are absolutely necessary in carrying insurance obligations.

MR. W. V. TURNER: I am impressed very much with two points made by Mr. Diggs. One is that the state should not engage in any business that can be as well or better conducted by an individual. The second is that the state should not be entrusted with funds that tend toward political corruption, to put it plainly. It seems rather a strange thing that in Pennsylvania in particular, where the people have been so earnest in the past few years to limit the funds that the state government or the politicians should handle, that they should take this fund, etc., which means so much to the working man and so much to the state as a whole and put it in the hands of a few men to handle. It is rather remarkable that men would have the audacity to foist another political fund on the state of Pennsylvania when we have had so much trouble in the past. I am a firm believer in the honesty of a large number of our men, but political expediency sometimes gets the better of natural honesty, and when it has to be a choice between expediency and honesty it often happens that expediency wins.

It is a habit with our form of government to change men every new moon and put in men who are unfamiliar with the line of work, with the result that they do not have the exceptional ability required to handle such business as they are largely entrusted with. And it occurred to me that it might be well if the working men, who are at least as much concerned as the employers, should have a representative on this Board. Then they would have power to audit the books and see what becomes of the money. It seems to me this is the only way the beneficiaries under this law can have anything like a fair knowledge of what becomes of the money that is appropriated or that is gathered in from the various employers. And of course in the last analysis this comes from the employers, there is no question about that. If any one thinks he will be getting something for nothing he is left, because it will be a tax upon the product, it will increase the cost of the product and consequently be shifted back on to the cost of living. All it means is that these burdens will be distributed among a larger number instead of falling upon a few as is the case today with the laws that are now in effect.

At best a state insurance can not give the success, the stability, the security, the safety that can be had from private enterprise. For the government not having men who are as well qualified, and certainly not having any money of their own at stake they will not give the inspection that is necessary to insure the safety that an insurance company will. I need not refer to hundreds of instances where state and federal inspection has been at fault, costing not only much money but thousands of lives. We do not find such things happening under the efficiency of a business organization.

I would like to ask one or two questions. I would like to ask how it comes that the people who have been demanding relief from large accumulations of money being placed in the hands of a few men, selected politically, came to let such a law be passed in Pennsylvania where the people have been expressly opposed to such acts on the part of our legislature for the past few years? And second, will the cost of this insurance on the whole be less burdensome upon all the people than the old method of limited liability? If it is it must add to the cost of the product and that must necessarily add to the cost of living.

MR. DIGGS: I will spend just two minutes answering these two questions, as I must catch a train. In the first place the people, who believe in the tendency which you have so well described, always go to the polls when there is an amendment to the Constitution to be voted on or something else that will lead to these things. They get into the legislature and they are always in the lobbies and are active, while the citizen who believes in more stable things stays at home. That is the answer to the first question. As to the second, the first cost will be more, but it will have its elements of economy. It will be more easily placed on the consumer, where it belongs, and in the next place it will save law suits, it will save heavy court expenses, it will prevent the demoralizing of your force to attend court, and there will be a number of other economies.

VICE-PRESIDENT: Before Mr. Diggs retires I will ask for a rising vote of thanks in expression of our appreciation of his instructive address.

(Carried unanimously).

In the absence of Mr. Diggs there are a number of gentlemen present who are capable of answering questions, or discussing the subject, and as it is yet early we would like a full and free discussion. Mr. Canty?

MR. F. J. CANTY: One gentleman asked a question as to officers of corporations coming under the law. In Iowa they are specifically excluded. In one instance recently the president of a corporation was severely injured. The insurance company having the risk considered that not only was he an officer but that he was also a workman, an employee of the corporation and therefore entitled to compensation, and they paid it.

I think Mr. Diggs could have enlarged on the cost. The immediate cost will be larger, probably two or three times what the liability cost now is in Pennsylvania. But when you consider the loss of time, the nuisance of litigation and the items of liability which can not be covered by your present liability insurance. Then there is the cost of the courts and juries. The ultimate cost to the counties will probably, not be as large as it has been under the old system.

MR. A. G. MITCHELL: Can an employee sue the company under the liability act and at the same time collect under the compensation law? What I have in mind to ask is whether he has a choice, and if so, when it must be exercised?

MR. CANTY: Under the provisions of the compensation law every one is supposed to come under the law unless he filed with the Board a written refusal to accept the terms of the act thirty days before an accident occurred. The act is presumed to be a part of every contract of employment, and the only way to avoid it is by this written notice, which must have been filed thirty days before any accident happens.

There is this possible exception. Under the New York law a man was injured working for the New York Central Railroad. The railroad took the position that the employee was not entitled to compensation under the New York State law because it was a common carrier subject to the jurisdiction of the federal laws only. The Court of Appeals within the last two or three weeks held that in all contracts of hiring within the state of New York, whether in interstate commerce business or not, the employer is subject to the provisions of the state compensation law, and therefore the New York Central was obliged to pay compensation to this man under the state law notwithstanding the fact that he was subject to the federal law as well. The New York and New Jersey courts have both held that if a man lives outside the state where he is employed he is entitled to compensation under the state law. In New York State at least there is available to the man two remedies, and under the New Jersey law he is entitled to compensation under the New Jersey law and also to bring a suit for damages in Pennsylvania.

MR. F. H. STARK: I do not believe I can say anything on this subject but Mr. Lydick is here and he can talk instructively to us on this subject.

HON. HARRY S. LYDICK: I came here to listen and not to talk. I have had considerable to do with this law in Pennsylvania, both in its making and in preparation to operate under it. The expense, as I feel at this time, incident to the casualty business will very largely increase under this measure. I was informed last winter in Harrisburg by a gentleman who told me he was an expert in matters along this line that during the year 1912 the compensation charges in the nation of Germany cost the people something like $500,000,000. It is a condition that is before us and we must prepare to meet it. These measures that are now in force in the United States are all of them more or less experimental. As legislatures succeed legislatures they will be amended. It will be the duty of every employer of labor within the Commonwealth of Pennsylvania during the coming year between now and the convening of the legislature of 1917 to watch carefully the operation of every part of this law and then through proper channels endeavor to have the legislation amended to eliminate the hardships and add matters that are absent that ought to be there.

There is one matter that I objected to in all these measures, that they relieve the employee of every kind of care. He is compensated for every injury that he receives except those intentionally self-inflicted. He may remove safety devices that you have placed for him to use and get hurt because he removes them, and yet you have to pay. He may do something absolutely in violation of your orders, and yet you must pay.

Now each of these Boards issues bulletins and they make very interesting reading. In Ohio a lady stenographer had jilted one of the employees of the firm and as she sat taking dictation the jilted lover came by and shot and killed her and the Board held that the injury occurred in the course of her employment and the company had to pay compensation to her dependents. Another case I know of was where the coal miner had shot his cut of coal and was about to shovel it into the car when the mine foreman came along and said the slate was dangerous and he must put a prop under it and "do it now while I am looking at you." He did. Then the mine foreman went away and as soon as he was out of sight the miner removed the prop as it was in the way in shoveling his coal and the slate fell and killed him, and the Board held that the employer had to pay compensation. Those are some of the things that ought to be eliminated. The law of Louisiana makes a very wise provision in that it mentions four classes of men who shall not recover. One is he who removes a safety device that is placed for his use and is hurt by reason of its removal. One who is acting in violation of law and is injured by reason of his violation of the law. There are two others. It is along those lines that these compensation bills should be amended. The employee should not be relieved from every possible kind of care. Under our law if you are a grocer and send out your young man to deliver groceries and he stops at a booze emporium and gets drunk and drives your conveyance before a car and destroys the wagon and has his feet cut off, that is a case of total disability and you will have to pay him 50% of his wages, up to $10 a week, for 500 weeks, limited to $4,000. These are some of the things that should be remedied. When this law passed last year in Harrisburg it was the opinion of all and the intent of all that this was simply a temporary matter to wait until the Constitution could be amended so as to enact a new one that would be constitutional and reach all the points wanted, and that would be in 1917. The Constitution has been amended so it no longer stands in the way of an act exactly of the kind the people may want, and at the next session of the legislature it will be done and it is up the employers of labor and the men who labor to watch for inequities in this bill and have them remedied in the next bill.

MR. J. C. WARNE: Is there any appeal from the decision of the Board in Pennsylvania?

MR. LYDICK: There is.

MR. WARNE: They have an English compensation law that they have had for many years similar to the one we have here. I think we discussed this matter about two years ago. I was reading in an English paper a short time ago of a man who was injured in a planing mill. He was a puller out at the back end of the saw and a piece came out of a board and fractured his arm. He was laid up for many months and they paid compensation to him under the law. After a time the employer thought he had done all that was necessary to do. They had a doctor examine him who said he was capable of doing a lighter form of work, therefore they offered him a job of carrying lumber, which he could do, and they would be relieved of a large portion of the payment. He refused, they appealed to the court and after the evidence was in the judge ruled that he should accept the lighter employment. They offered to give him 75% of his former wage and the court ruled that he was capable of that lighter employment and the compensation should be reduced. Is there anything in the Pennsylvania law that would cover a similar case?

MR. LYDICK: As to the matter of appeal, the facts are found by the Referee and there may be appeals to the Common Pleas and to the Supreme Court, but only on matters of law, not on matters of fact.

MR. TURNER: The speaker has said that the employer will have to pay these large costs. That is a point I can not see. I do not think the employer pays it at all. Is it not all of us who pay it and not the employer except his prorata? Are we not all indirectly taxed to pay this large increase, and because of that is it not incumbent upon every one of us to see that the state funds are well guarded and protected?

VICE-PRESIDENT: Will any one answer that?

MR. D. J. REDDING: The employer actually pays the bill. He may increase the cost of the product and distribute it to the consumer, but first he pays the bill, though he may recover it later on. Even if you turn it over to the insurance company and they pay it, you really pay it in premiums.

MR. TURNER: That is what I wanted to bring out. A great many men have the idea that all that is required is to enact this law and in some miraculous way everybody will be compensated without any expense to themselves. If the real facts are understood by those who really pay the bills they should have interest enough in the matter to see that it is properly carried out.

MR. SATTLEY: If a corporation should elect to adopt the state fund insurance and the law should be declared unconstitutional, what protection would it have?

MR. LYDICK: If an employee has been injured and thereafter the law has been declared unconstitutional, then what protection has the employer as against that accident? I am inclined to think the employee injured before that decision would have to accept the amount fixed in the law.

MR. SATTLEY: Yes. The expense of making this law effective will absorb the $300,000 fund. Where will be your protection?

MR. LYDICK: That $300,000 is not there for the payment of accident compensation, it is to pay the expenses of the state commission in administering this fund. The money with which the compensation will be paid will be gathered in premiums by the state insurance board from those who see fit to insure in the fund. In case the state fund should become insolvent, a matter that I can hardly see would happen with any kind of discreet management, I think the employer would be safe. If it is declared to be unconstitutional after an accident had happened I think the employer would be safe for the reason that this is a bill that he is under by consent, and having consented to operate under the bill I am inclined to think the employee will be bound by it as to all accidents happening before it was declared unconstitutional although declared unconstitutional as to others. But I do not want to get too far from land on these constitutional questions. I was in Harrisburg last winter when this law was being discussed and there was no lawyer there who would hazard an opinion upon any part of it as to its constitutionality or unconstitutionality. We took it as an experimental matter and that is what you will have to take it. We will none of us know what it really means until the Supreme Court has passed upon the different parts of it.

MR. CANTY: If the compensation law should be declared unconstitutional I would say he would stand in just the position he stands now, he would have to respond in damages. A question was asked in regard to the cost. The cost will be from two to three percent of the pay roll. That is to say for every $100 of pay roll expense as a risk the cost will be $2 to $3.

MR. TURNER: Isn't that equivalent to a reduction of wages or salary to each worker in the plant?

MR. CANTY: The compensation is limited to a minimum of $5 and a maximum of $10 per week. If a man makes $25 a week the msot he can get under the law would be $10.

MR. TURNER: That is not just exactly what I intended to ask. What I intended to ask if whether the cost of the insurance is not equivalent to a reduction in wages to each workman in the plant?

MR. CANTY: Yes in the long run.

MR. F. M. HOOVER: Do you ask whether that will be deducted from anybody's pay directly or indirectly?

MR. TURNER: Indirectly in the last analysis will that not be added to the cost of the firm's protection and be shifted on to the consumer and be the equivalent of 3% reduction in salary of all those who are not injured?

MR. HOOVER: I think as Mr. Redding stated that would necessarily come from an additional tax on the product to provide for protection for the employee. Most of you know of a form of insurance that has been written for a number of years in this state which is called collective insurance. That is similar, as far as weekly benefits are concerned to our coming workmen's compensation law. Employers of labor have in a great number of cases made arrangements with employees and each contributed toward the cost of collective accident insurance. That was a mutual agreement between employer and employee but under it conditions of the new workmen's compensation law the employer cannot be assessed but the premium must be borne entirely by the employer.

PROFESSOR L. F. ENDSLEY: I would like to ask a question. I know of a company who have now an agreement with all of their men whereby they pay a certain percent per month of their wages and there is specified in this agreement just how much each employee is to receive if he is injured or killed. Will that arrangement be still in force or will that in any way relieve the employee from other than the agreements with his employer.

There is one other point which we in this country do not appreciate, that is the seriousness of a man's own carelessness. In one foreign country of which I know there is a law that a man must cross at a street crossing. If he is hurt between intersections of streets instead of getting damages he is fined by the government. It seems as though a man is more afraid of his pocketbook than of his life and therefore he goes to the street crossing and fewer people are hurt than in our cities because the man knows he will have to pay for it if he gets hurt.

MR. TURNER: My understanding of this law is that it is a tax on all of us for the benefit of some of us. It is the same as if we all collectively in this room agreed to give so much each day or week for the benefit of any one of us that might get injured. If such a thing comes in an indirect way and even though it comes in the way of an increase in cost of living we are apt to overlook it. By indirect taxation, it is easy to tax a man to death, particularly if every time $1.00 taxation is added 80 cents increase of pay is given.

MR. E. W. HANKELEE: There is one thing that has not been brought out clearly, whether this law is effective in regard to employees who are employed where there is impure air or water or over-exhaustion or anything like that, if the company is liable to them.

MR. LYDICK: Section 301 of the bill describes the accidents that come under this law. I do not know that I can repeat it, but it is some injury to the physical structure of the body, a forcible injury. This does not cover occupational diseases. And it covers the results that follow from the injuries recited.

MR. A. G. MITCHELL: Closing this very interesting discussion I move that we adjourn with the thanks of the Club to all those who have discussed these questions so intelligently.

The motion was carried and adjournment was had at 10:30 P. M.

J. B. Anderson
Secretary.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF AUGUST 24, 1912,

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[SEAL] F. D. ECKER,

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(My commission expires January 15, 1917.)

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RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of November, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—"The Railroads and National Defense," by George D. Snyder.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—"The Fuel Department—A Constructive Criticism," by L. G. Plant.

Canadian Railway Club, Jas. Powell, Secretary,
Chief Draftsman, G. T. R., Montreal, Canada.

SUBJECT—"Rubber as Related to the War," by A. D. Thornton.

Richmond Railway Club, F. O. Robinson, Secretary,
c/o C. & O. Ry., Richmond, Va.

SUBJECT—Annual Meeting.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—"Pleasant Valleys and Rocky Mountains," by H. R. Lefffingwell.

Southern & South Western Railway Club, A. J. Merrill,
Secretary, Box 1205, Atlanta, Ga.

SUBJECT—"Locomotive Inspection," by F. McManamy.

Central Railway Club, Harry D. Vought, Secretary,
95 Liberty Street, New York City.

SUBJECT—"Rubber, from Raw to Finished Product," by W. C. Mullett.

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

SUBJECT—"Workmen's Compensation," by W. S. Diggs.

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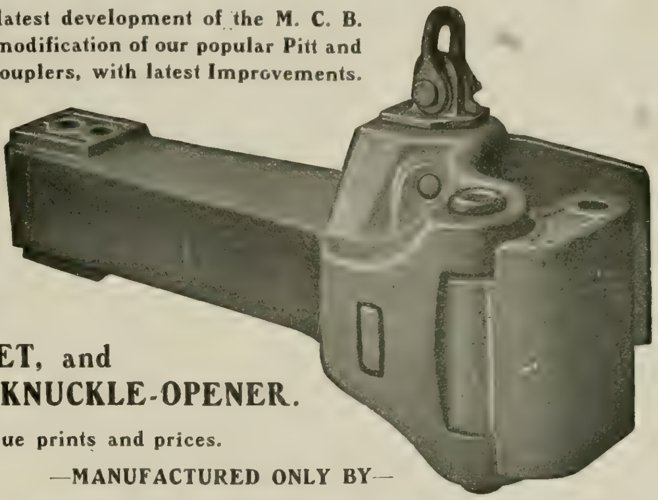

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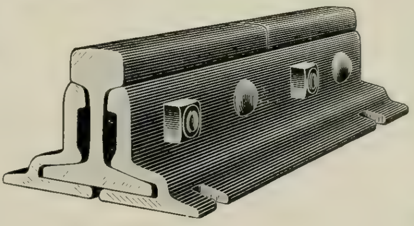

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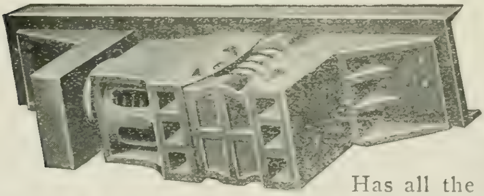

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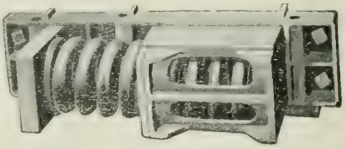

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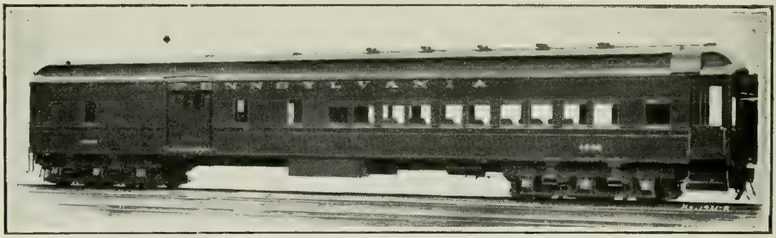

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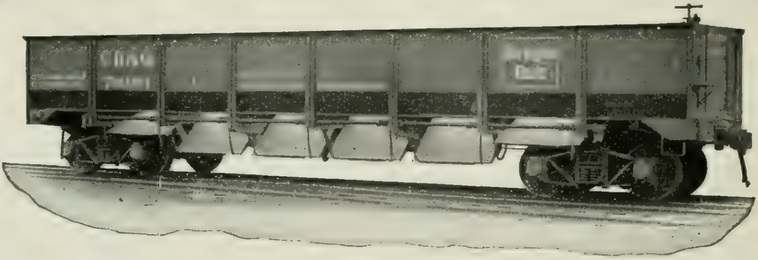

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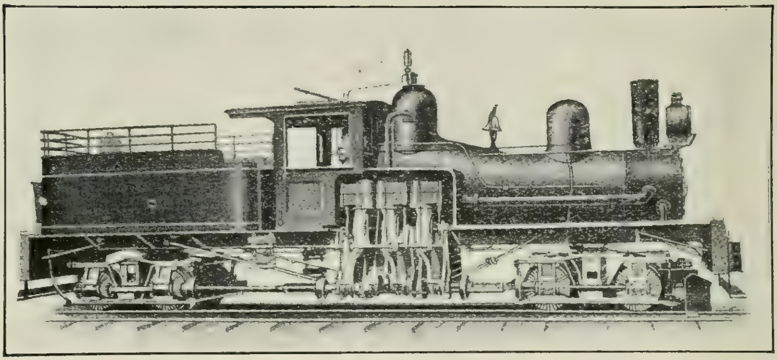

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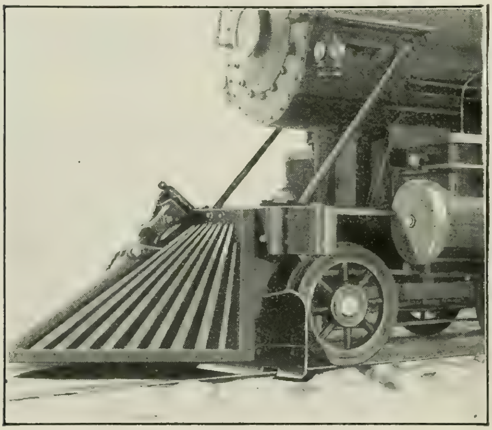

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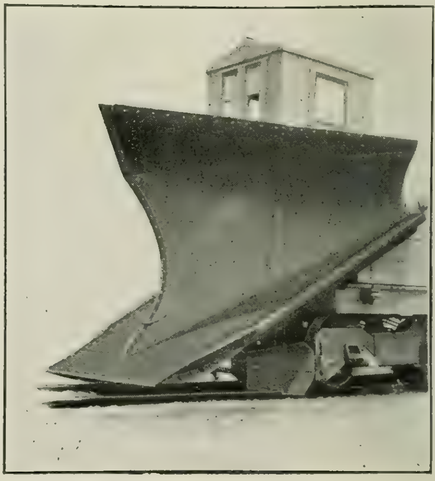

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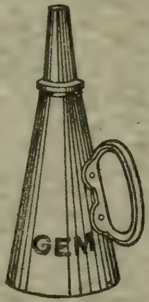

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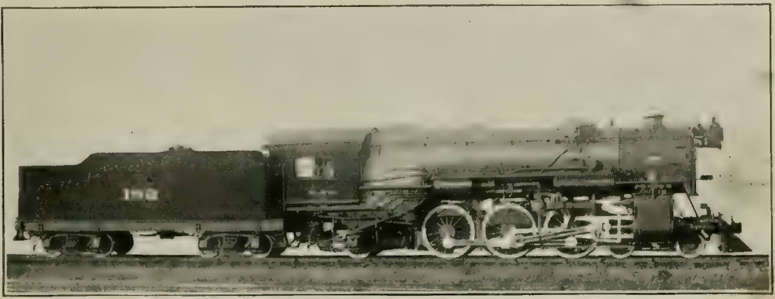

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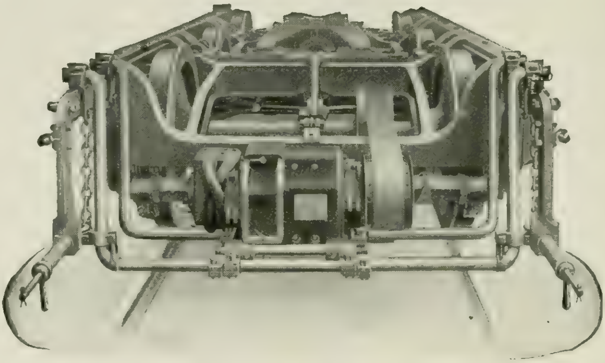

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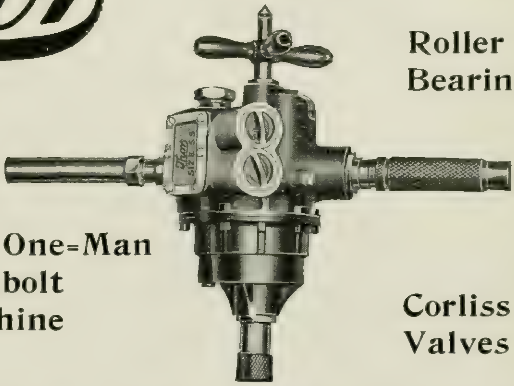

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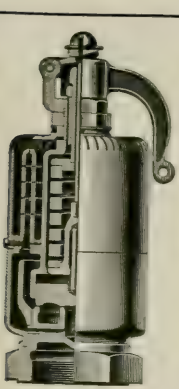

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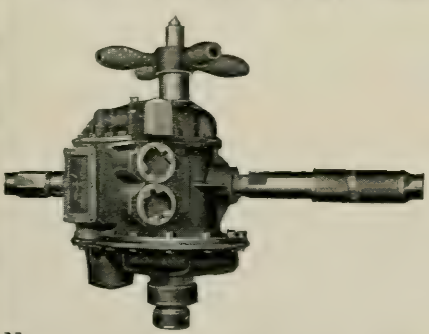

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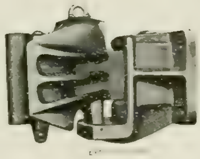

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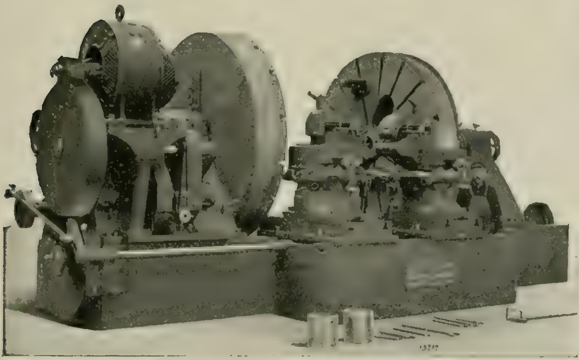

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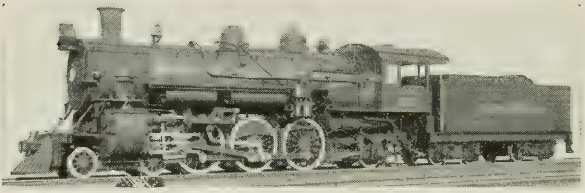

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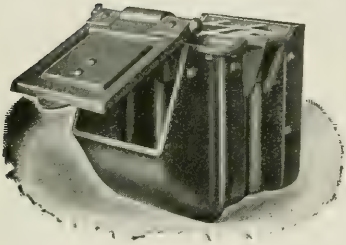

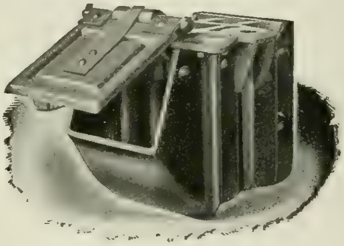

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A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

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Howe, D. M.
Howe, Harry
Huchel, E. W.
Huchel, H. G.
Huchel, Wm. J.
Hudson, W. L.
Hunter, J. A.
Johnson, W. A.
Kaimakan, M. A.
Kelly, H. S.
Kinch, L. E.
Kinter, D. H.
Klein, R. A.
Knickerbocker, A. C.
Knox, Wm. J.
Kneutter, Wm.
Koch, Felix
Krepps, T. S.
Lang, W. C.
Lansberry, W. B.
Lehr, H. W.
Lidstone, F. J.
Lindner, W. C.
Loughridge, H. W.
Lynn, Saml.
Lyons, R. S.
Marcus, N. M.
Mason, Stephen C.
Maylock, E. A.
Mitchell, A. G.
McAbee, W. S.
McCollum, G. C.
McFeatters, F. R.
McNulty, F. M.
Neel, T. M.
Newburn, T. W.
O'Connor, M.
Orchard, Chas.
Painter, Joseph
Parke, F. H.
Pennepacker, N. W.

Pickels, H. D.
Pie, J. J.
Postlethwaite, C. E.
Reynolds, Thos.
Richardson, W. P.
Roemer, W.
Rose, A. J.
Shaffer, G. C.
Shaner, E. L.
Sleeman, W. C.
Smith, J. B.
Smith, J. H.
Smoot, W. D.
Snyder, Joseph
Stucki, A.
Suckfield, G. A.
Taylor, F. C.
Thomas, E.
Unger, J. S.
Wagner, E. A.
Waggoner, R. E.
Wardale, N. H.
Warner, E. O.
Williamson, J. A.
Wyke, J. W.
Zortman, C. E.

VISITORS.

Beaumont, C.
Bell, R. P.
Ferell, H. N.
Flynn, R.
Gilmore, A. G.
Hansen, G. L.
Hoffstot, H. P.
Hooven, A. E.
Mathias, D. L.
McConn, G. E.
McLean, K.
McLeod, J.
Pitt, W. R.
Saylor, H. G.
Shropshire, C. P.
Sneck, H.
Stenson, G. A.
Tessemen, E. W.
Thomas, G. D.
Truby, F. L.
Wickerham, F. A.
Wyke, J. P.
Yawman, C. A.

PRESIDENT: The calling of the roll will be dispensed with as we have the attendance by registry card. The reading of the minutes of the last meeting will be dispensed with as they are in the hands of the printer and will reach you within a few days.

The Secretary will please read the list of applications for membership.

SECRETARY: Mr. President and gentlemen: We have the following applications for membership:

Bell, R. P., Chief Clerk to M. C. B., P. & L. E. R. R., McKees Rocks, Pa. Recommended by W. C. Lang.

Boyd, D. H., Civil Engineer, Penna. R. R., R. F. D. No. 2, Sharpsburg, Pa. Recommended by T. H. Gray.

Hoffstot, H. P., Assistant Manager Sales, Central District, Pressed Steel Car Co., Farmers Bank Building, Pittsburgh, Pa. Recommended by C. E. Postlethwaite. (reinstated)

Mathias, D. L., Research Metallurgist, Mackintosh, Hemphill & Co., Twelfth and Etna Streets, Pittsburgh, Pa. Recommended by L. E. Kinch.

Murphy, Paul F., Civil Engineer, Penna. R. R., Eastern and Freeport Avenue, Aspinwall, Pa. Recommended by T. H. Gray.

Rambo, R. E., Civil Engineer, Penna. R. R., 601 Hampton Ave., Wilkinsburg, Pa. Recommended by T. H. Gray.

Rupprecht, K. J., Clerk, Penna. R. R., 317 N. St. Clair Street, Pittsburgh, Pa. Recommended by T. H. Gray.

Snyder, C. H., Chief Clerk to Master Carpenter, Penna. R. R., Eastern and Freeport Avenue, Aspinwall, Pa. Recommended by T. H. Gray.

Wallgren, N. O., Estimator, Kennedy, Stroh Corporation, 200 Seventh Street, Oakmont, Pa. Recommended by T. H. Gray.

PRESIDENT: When these applications have been approved by the Executive Committee the gentlemen will become members of the Club.

PRESIDENT: There being no further business we are to the point, where Mr. Samuel Lynn, Master Car Builder of the P. & L. E. R. R., will read a paper on "The Life of a Steel Freight Car. It is my pleasure to introduce to you, Mr. Lynn.

THE LIFE OF A STEEL FREIGHT CAR.

By Mr. Samuel Lynn, Master Car Builder, P. & L. E. R. R.

Some two or three months ago I received a request from our Secretary to prepare a paper for this Club and the subject assigned was "The Life of a Steel Freight Car." However, feeling that I could not do justice to the subject—as from my experience there seemed to be quite a diversity of opinion as to the life of a steel car—I so advised our Secretary, but he appeared to think it was up to me to present a paper of some kind and insisted that I do so. While presenting papers or making speeches is not in my line, I shall endeavor in my own way to point out a few of the problems with which the car man has to deal in trying to keep his steel car equipment in service.

In preparing this paper it was decided to get the opinions of some other car men regarding the life of a steel car—so that in presenting the paper we might not entirely miss the mark—and I wrote to several of our friends who have had considerable experience with steel cars. Their replies showed conclusively that there is quite a diversity of opinion and in order to satisfy them and protect myself should they chance to be here to night, I will have to say that a steel car will last anywhere from eight to fifty years, as these are some of the expressions received in answer to my letters of inquiry. But, realizing that "Yours Truly" must be the "goat" tonight, I do not wish to mention the names of our friends who made these assertions.

After a careful consideration of the subject I believe you gentlemen will appreciate the fact that a paper of this character, permitting of such a wide period or time limit in the opinions of different men who have to do with steel car maintenance, would have little weight in determining the actual life of a steel car.

Nevertheless, we have all formed opinions regarding the probable life of certain classes of steel equipment, and these opinions are based on experience and conditions that have come directly under our observation. Therefore, instead of confining the subject strictly to "The Life of a Steel Car," I should prefer to digress slightly and if you will permit me to assign a subject would suggest that the subject for discussion be "What Maintenance is Necessary to Get the Maximum Service from a Steel Car."

Years ago while working on the shop tracks repairing the old wooden cars, I can remember distinctly seeing an occasional train of steel cars or "battleships" as we called them, go by, and the repairmen would get together and discuss the question of where they would get their bread and butter when the old wood car finally went to the scrap pile. There are some car officials at even this late day who apparently feel that the steel car does not require much attention. However, this theory is no longer given much consideration, as any of us responsible for steel car maintenance realizes that while the steel car, with its larger carrying capacity, increases the earnings of a road, at the same time after the car reaches a certain age its maintenance cost increases over that of the old wooden car. As a consequence there are several things that must be considered when discussing this subject.

First: It seems to me that the one of most importance is the design of the car. Care must be taken to get the required strength in the underframe in order that the car may withstand the shocks incident to present-day transportation. In addition to a good solid underframe, the draft sills and draft gear must be equally strong to stand up to their work. I have seen new cars turned out of a car plant and after the first or second loading the draft sills, or center sills extending from the end sill to the front of the body bolster, were so badly buckled that they had to be removed and replaced and additional reinforcement added to strengthen the weak members; and these cars, although practically new, were useless until the items mentioned had been reinforced to take care of either oversight or poor judgment in the drafting room. Consequently, too much stress cannot be laid upon proper design before the car is built and placed in service.

Second: The commodities with which a car is loaded and the climate conditions in the territory through which it travels are important factors in the life of a steel car. The cars in this territory used exclusively in the coal, coke, and ore trade are subject to very severe service, as they are usually hauled in heavy tonnage trains, and the acids in the coal and coke eat through the floor sheets very rapidly. In addition to the injurious effects of the acids on the inside of the car, the varying weather conditions, rain, snow, and heavy damp atmosphere, play important parts in the deterioration of the car.

As has been previously stated, at one time a number of Car Department Officials were of the opinion that the steel car required but little attention, and as a result in its early existence even the car inspectors would look over the car primarily for safety appliance defects, hot boxes, etc., and take it for granted that because the car was of steel construction it was all right, and for some reason, the steel car from the time it first went into service did not seem to have a friend. At the industrial plants where the cars were unloaded the men employed there took frequent cracks at it with a sledge and as a result the side and hopper sheets soon became bent and distorted. During the winter season when ore becomes frozen in the cars, some of the plants use dynamite to loosen up the ore and in addition they frequently loosen up the floor and side sheets at the rivets. If the steel car was given reasonable treatment and repairs made when needed, and repainted when the steel became exposed to the weather, the renewing of some of the parts would not become necessary for a longer period than is now the case.

From observation it has been found that the original painting of the steel car is usually faulty. Owing to the hurry-up methods of the contracting builder the required quality of paint is liable to be dryer-sacrificed, or made to fit the building time of the car, without giving the demanded protective qualities of the paint its due consideration. I do not want to be understood as saying that paint will cure all the ills of the steel car, but do believe that if a liberal quantity of good paint was used to protect all outside exposed parts, the life of the car would be lengthened considerably. Occasionally we may hear of some railway official using the expression that "a steel car will run and earn just as much money without paint." This may be true, but the question arises, how long will it run? I firmly believe that part of the expense necessary on steel equipment today is due to paint neglect. I do not favor painting the inside parts of any steel car—the first loading would cut and mar the paint so that moisture would get under it—but by keeping the outside exposed parts of the car painted, the corrosion of the outside parts of the sheets would be counteracted to a considerable extent.

At this time would be pleased to show several views of a steel car known as the "hopper type" car.

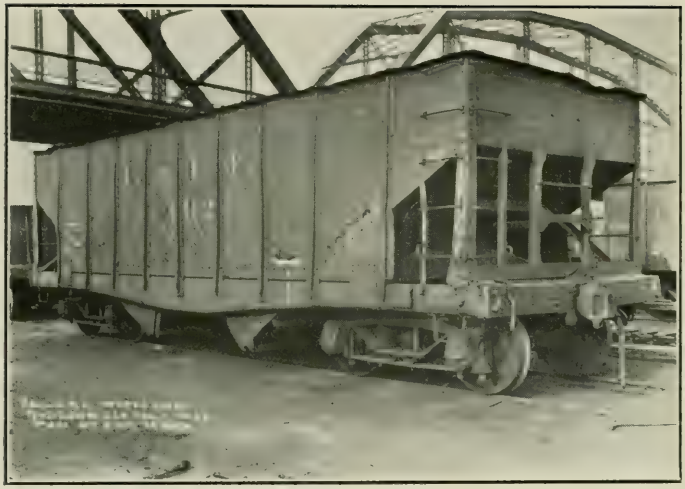


Figure 1

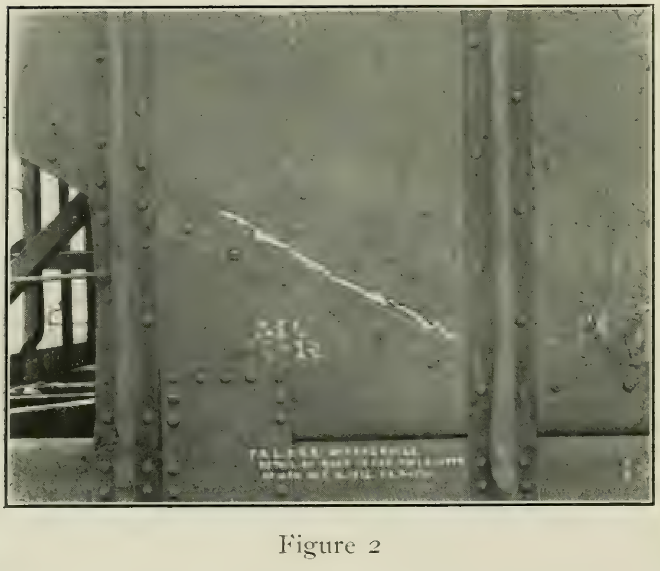


Figure 2

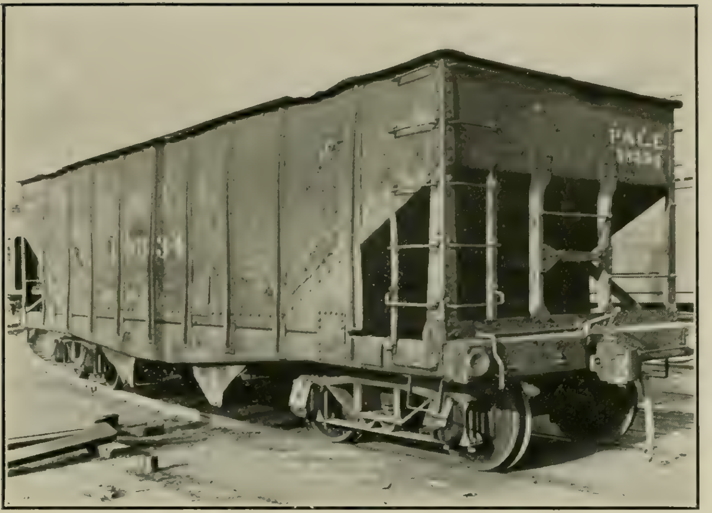


Figure 3

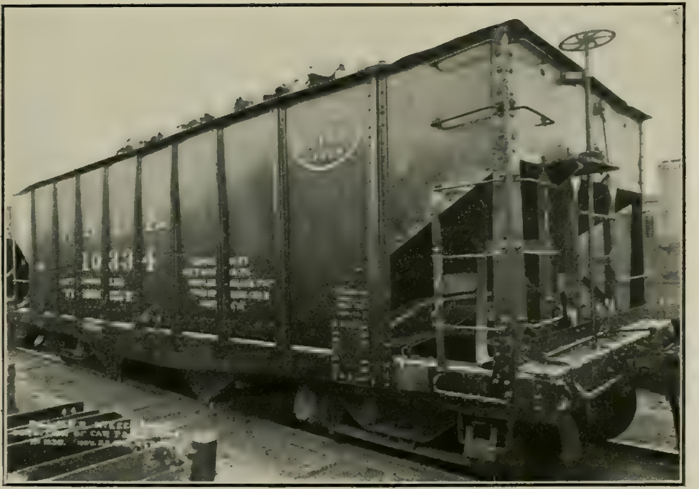


Figure 4

These pictures show the effects of corrosion on the steel sheets on the sides of the cars, and also the effects of the acids. You will note along the floor seams along the hopper at each end of the car, the side sheets are entirely worn or eaten through. The white spots appearing in the sheets on the sides of the cars are canvas or paper placed on the inside of the cars so as to make the defects in the sheets show up more prominently. Figures 3 and 4 are reproductions of photographs of the same car, as you will notice by the number on the car in each cut —10334. A photograph was taken of the car when it came into the shop before the repairs were started on it, and after the car had been repaired and turned out into service, and loaded at one of the mines, another photographer was taken of it. You will observe the car is now under load and from its appearance the car should continue to earn money for the owners for some years to come. These cars are owned by the road with which I am connected and have been in service for 16 years. In order to keep this type car in service it has been found that after the first 10 or 12 years service the floor and hopper sheets have deteriorated from ¼" in thickness to a very light gauge. In fact along the seams and sides of the cars where the floor sheets are riveted to the sides, in some cases the steel is completely eaten or rusted through, and in order to get any further service from the car it is necessary to renew the floors and hoppers. This has been done on a large number of steel hopper cars at at approximate cost of $225.00 a car. After this class of repairs is completed and the cars have been in service again for about four years we find that the car sides which were in fairly good condition when the new floors were applied have deteriorated to such an extent that it is necessary to renew the sides of the cars. This work can be done at an approximate cost of $130.00 a car, making a total approximate expense of $355.00 a car on the car body, exclusive of various light repairs necessary at different periods.

While this class of repairs was being made it was found in a few cases that the center sills had deteriorated to some extent from corrosion. They had also buckled due to shocks received in transportation, making the application of new sills necessary. On such cars where new sills were applied there was an additional cost of $45.00, making the total amount spent on the car body approximately $400.00. However, on a very large percentage of the cars on which this class of repairs is being made we do not find it necessary to renew the center sills. These sills, in most cases, have been reinforced between the body bolsters and the hopper sheets by a tie plate or channel section riveted to the sills, the cost of this application being included in the estimates already given.

From the above it would seem, Gentlemen, that the bodies of the majority of the first steel cars built, or cars that have been in service 16 or 17 years, will require repairs amounting practically to the rebuilding of the car body. This rebuilding process, however, occurs at different stated periods, whereas if all the parts of any unit of equipment deteriorated at the same rate, there would be no question but that the average depreciation could be fixed very closely, as every part of the unit would become worn out at the same time and the whole body of the car would therefore probably be scrapped or rebuilt as a new unit. The present policy of maintaining the steel car as different parts fail is practically the same method as was employed in the maintenance of the wooden car equipment.

It has been the custom of Car Department Officials to estimate the life of the wooden car of either the box or gondola type at 20 years. The old wooden car, during the 20 year period, received at different times repairs such as two or more longitudinal sills, the renewal of the top side plank, new floors, and other repairs which amounted practically to the rebuilding of the car, yet for general purposes 20 years was considered the average life of the wooden car.

Allowing the same treatment for a steel car, that is, giving it general repairs when necessary and properly maintaining the car so as to get maximum service from it, the steel car is still in serviceable condition after it has been running 16 or 17 years.

There are some Mechanical Department Officials who take the position that it is more economical to prolong the life of the car by repairs, while there are others who say it is better, from an economical standpoint, to run the car until it requires repairs such as have already been described as necessary for the car after it has been in service about 12 years, and then scrap the body and place a new body on the trucks, as they take the position that when the floors and hoppers are worn out, the balance of the car has deteriorated to such an extent that it is cheaper to scrap the body than to try to maintain it.

From what has been stated, Gentlemen, and from your inspection of the photographs which show some of the cars that have received the repairs already described, you will no doubt agree with me that I would not be justified in saying it would be good policy to scrap these cars.

Will you now look at a photograph of the first metal car purchased by the Pittsburgh & Lake Erie Railroad Company.

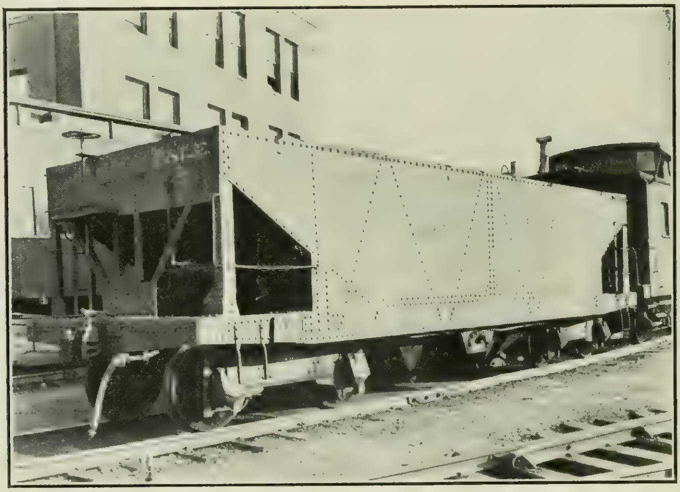


Figure 5

This car, excepting short periods when it was in the shop for class repairs, has been in continuous service since June 1897, and is therefore over 18 years old. It is an 80,000 pound capacity car of the hopper type; has a cubical capacity of 1286 cubic feet; weight new 35,700 pounds; weight last time weighed in June of this year, 35,200 pounds. The car was built of wrought iron by the Youngstown Bridge Company and is in good condition today. The original sills, bolsters, end sills and draft members, as well as the sides, are still on the car. The car received heavy repairs in the years 1912 and 1915 at an approximate total cost of $450.00. After a close inspection of the photograph I do not believe there is any one present who will say that the appearance of this car indicates that it should go to the scrap pile.

In addition to the photographs already presented, I take the liberty of showing a photograph received from our friend Mr. F. W. Dickinson, Master Car Builder of the Bessemer and Lake Erie Railroad. He adivses that this is a photograph of their first steel car. The car is over 19 years old, having been built in 1896, and from the information received from Mr. Dickinson I believe this car has received at different times class repairs such as I have already described, and Mr. Dickinson states that all the cars in this series are in almost as good condition as when first built. This will show that the Bessemer and Lake Erie Railroad is one of the pioneers in the steel car game, yet Mr. Dickinson advised it was practically impossible for him to make any definite statement as to the probable life of a steel car.

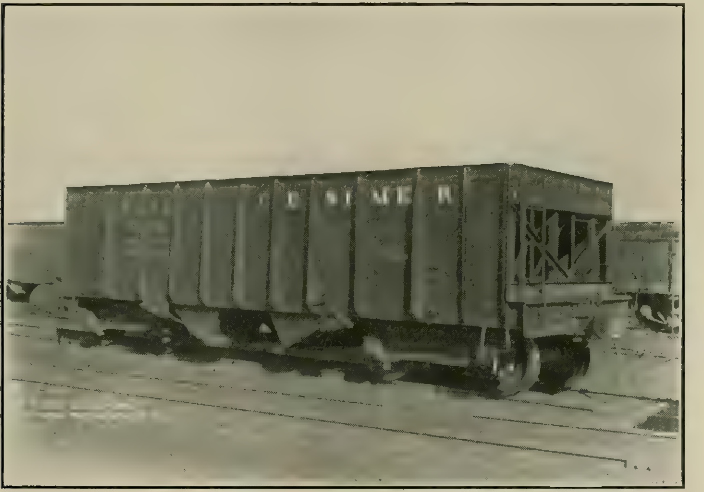


Figure 6

As has been stated in the first part of this paper opinions have been received ranging from eight to fifty years as being the average life of a steel car, but believe you will agree with me that as long as this type of car meets the requirements as to carrying capacity and stands up under the service for which it was intended, justice would not be done the steel car were we to try to place a limit on its life.

There is one other reason why we should refrain from placing a limit on the life of the steel car, and that is, the steel that is now being purchased and used for repair parts is inferior to the steel that went into the first cars built. While I am not a steel man and know nothing about the business, the fact remains that the steel plates that are being purchased and used for repairs are deteriorating much faster than the original sheets placed on the cars. Whether this is due to the composition of the metal, or to some other cause, I do not know. However, if this same grade of steel is being used by car builders today on new equipment, and an estimated aevrage life was placed on cars based on the lasting qualities of the material used when steel cars were first built, the steel in the cars that are being built and turned into service today might not last more than one-half the time of the steel in the cars first built, and it is therefore my opinion that we would be doing the steel car an injustice to say that at the end of any stated period it should be relegated to the scrap pile, and I therefore believe that the steel car can be maintained as long as the owner desires to run that particular type of car.

In presenting this paper I have touched on only a few of the important items which to my mind have to do materially with the life of a steel car, and if anything has been suggested that will bring out a discussion among the members, the purpose for which the paper has been presented will have been accomplished.

Discussion.

PRESIDENT: Gentlemen: This is an interesting subject and it is now open for discussion. I notice quite a number of car men here and we would like to have you express your opinions or ask any questions you would like to have answered.

MR. L. C. BIHLER, Traffic Manager, Carnegie Steel Company: Mr. President and Gentlemen: They seem to be bashful tonight, so I will be the "goat."

Mr. Lynn has read a very interesting paper. It is interesting to me because of the fact that, from the commercial standpoint, as late as October of this year I ended an investigation to find out "what is the life of a steel car," for our own purposes. The reason for that investigation was this: I knew that the steel car, which first came into use about 1896, was figured roughly in our minds to have lasted perhaps nineteen years, and we, of course, were interested from the standpoint of the manufacturer who supplies this steel to the car companies. We were anxious to know whether they would last as long as they were supposed to. We were seeking this data for the benefit of the car builders, as well as ourselves, because we knew they were thinking of the same thing. This is corroborative of what Mr. Lynn has developed.

We addressed every railroad in the Pittsburgh District, and also the immediate connections of the shorter lines, asking them for their opinion of the life of the steel car.

One road said, "In about ten years they will have to be rebuilt except the trucks." Another one said, "Nothing has as yet been developed to determine the life of a steel car" and that road had been using steel cars seventeen years. Another one said, "The body is gone in ten years." One road said, "The life depends on the treatment and, in some cases, is only ten years." Another road said, "The life is indefinite. By alternating reconstruction of the floors and hoppers and sides, you can carry out to an indefinite period the life of a steel car and we don't know what that length of time is." Another road said, "There is no answer. The money expended for repairs is a governing factor."

I had another interest in Mr. Lynn's paper by reason of the fact that in 1896 the Carnegie Steel Company was a sort of a pioneer in its experimenting with steel hopper cars. We built at the Keystone Bridge Works, which we then owned, in the City here, two very heavy steel cars. They were so heavy that when loaded full they exceeded the Pennsylvania Co. weight limits. We put them in the ore trade between Lake Erie and Pittsburgh. The bridges and roadbed would not sustain them, but that was later recitified. They were lettered Carnegie Steel Company 1008 and 1009. Mr. Dickinson of the B. & L. E. R. R.

can probably say whether that was not one of them shown by the photograph on the screen.

In a good many of these answers by the Railroads reference is made to the fact that the second, third or fourth orders are of heavier construction and they expect the life to be longer. I want to contribute that much to the history of the situation, as far as we know.

Now, to get down to some of the points in Mr. Lynn's paper, the first thing I noticed in running over this paper was the reference to dynamite. "Not guilty." That certainly is the wrong kind of treatment for a steel car. Our practice has been to get the frozen load out through the process of thawing with a steam pipe. There is nothing to this thing of mutilating or damaging the other fellow's equipment, and I assure you the receiver of the car is very much watched by the carriers. It is easy to determine on whom the burden falls when any cars are damaged through the use of dynamite.

In my dealings with the transportation question it has come under my observation that part of the deterioration or wearing out of the floor plates in the hopper car is caused somewhat by the action of rain and the sulphur in the coal. Cars loaded with coal often stand around Lake Erie ports forty or fifty days, particularly in times of car shortage; they ship ten cars today, no cars tomorrow, and it frequently takes a long time to accumulate a cargo. Also in the sliding of the coal on the plates. Now, that is what you were up against some years ago.

I remember our friend, the late Julius Krause, referred to this one evening. I made a remark which is good enough to repeat: That people in the steel business and car business don't want them to last forever, for if you do, where is the tonnage of ore, coke and limestone used in steel production going to come from. There ought to be a wearing out time. We don't want the plates to last forever, but, of course, we are interested in having them last a reasonable and fair length of time considering the money invested.

One of the most important things determining the life of a steel car, we think, is the question of maintenance. If you spend the right amount of money, at the right time you can get your prolonged life and service.

There is one other feature. Steel cannot stand all kinds of treatment. Shape steel, particularly after it is once rolled, ought not to be subjected to any and all kinds of treatment. Now, the opinion I have is that some roads, when a steel car gets into a wreck and gets a bad jam, rush it into a car shop and "jacks" it from the inside and outside, within and without, and all around, and it may be that some of the force of that jack pressure has an effect in breaking parts of the car, subjecting it to a strain it was never intended to stand originally. I am not mechanical enough to make that as a statement of fact; I am making that as a suggestion. There may be something in it. I would like to hear the practical men discuss that. But, if the cars are always treated as steel should be treated without being subjected to undue pressure in the repair shop, the life will be considerably lengthened.

I am just a plain traffic manager and I would like to hear some of the practical men discuss this subject, and I may want to say something later on.

MR. J. S. UNGER, Manager, Central Research Laboratory, Carnegie Steel Co. Mr. President and Gentlemen: I was also very much interested in Mr. Lynn's paper and had just a little time this afternoon to dictate a few notes, and I think it would probably be easier for me to read them.

Mr. Lynn has presented a subject that is of particular interest to the majority of our members. During a period of twenty years the steel car has been developed in the United States, and is now with us to stay.

Nothing made by man is absolutely perfect. The steel car is not perfect in every particular, but its overwhelming superiority over the wooden car for most purposes indicates that, except for some few special purposes, the user will not return to the wooden car, even if such a car could be built of the same carrying capacity.

The life of a steel car is dependent on so many factors that it would be very difficult to determine what its life would be without knowing the use to which it was put. This belief is shared by others. Mr. G. A. Post, President of the Railway Business Association, in an article in the Railway Age Gazette of January 23, 1914, page 165, makes this statement, "Maintenance of steel cars as compared with wooden is a matter of guess work. Repair and renewal of metal parts common to both types would probably cost more on steel than on wooden, because of the greater weight and severity of jarring. The higher rigidity of the steel car in rounding curves would also tend to faster mortality in wheels, trucks and buffing mechanism."

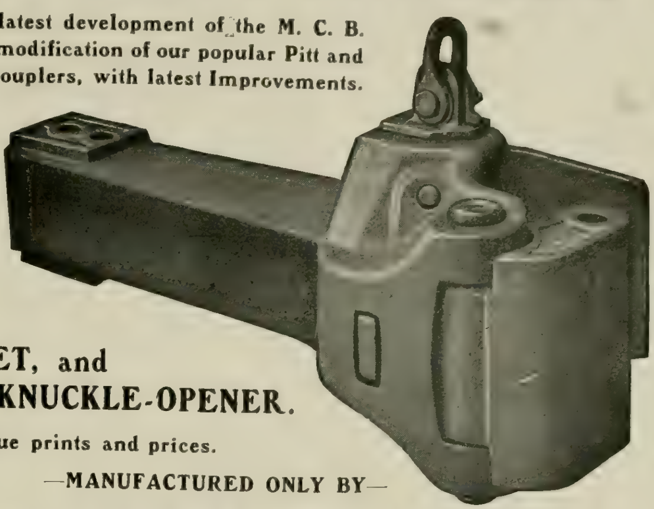
When the steel car was first brought out, it received the same treatment that was given the wooden car. This can hardly be said of the steel car of today. A number of factors have influenced the life of a steel car, among which are the following:—

1.—An increased use of the steel car, opening up a much wider field.

2.—A growing tendency to increase the load in the steel car.

Practically the same body is used today as in the original cars which were rated at 80,000 to 100,000 pounds carrying capacity. We now expect this same body, (I do not speak of the underframe), to serve for a 140,000, 180,000, or the proposed 220,000 pound car. I quote from the American Railway Engineering Association Bulletin No. 167, July 1914, Page 5, "Of almost equal importance with the increase in the weight of motive power at the present time is the corresponding increase in the weight and capacity of freight cars. The freight car of 100,000 pounds capacity has now largely replaced those of 60,000 and 80,000 pounds capacity, which were standard a few years ago. Cars of 115,000 pounds capacity have been largely adopted by the Eastern roads for coal, coke and ore traffic. Only a few months ago the Chesapeake & Ohio ordered 1,000 cars of 140,000 pounds capacity, while the Norfolk & Western built 750 gondola cars last year with a rated capacity of 180,000 pounds. Thus the tendency towards the adoption of larger cars is plainly evident, and it may confidently be predicted that their use will become quite general on those roads handling large volumes of mineral or other heavy traffic."

3.—The harder service, or what I may call abuse, not use, of



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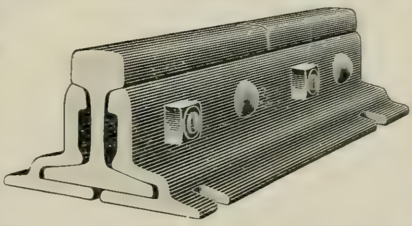

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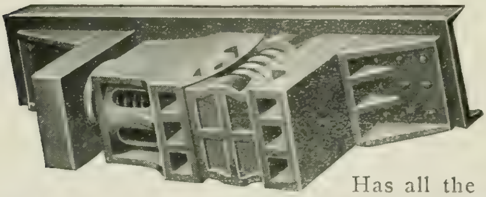

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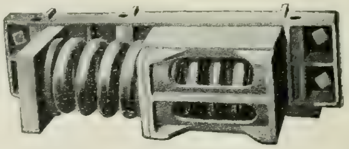

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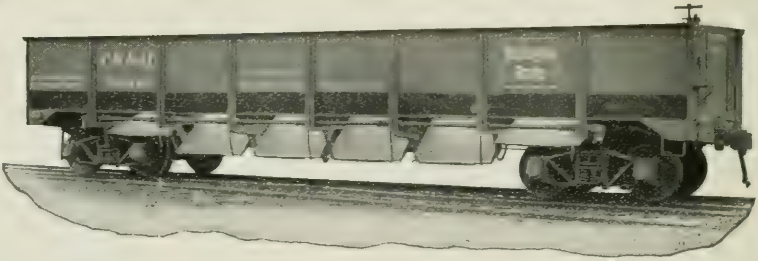

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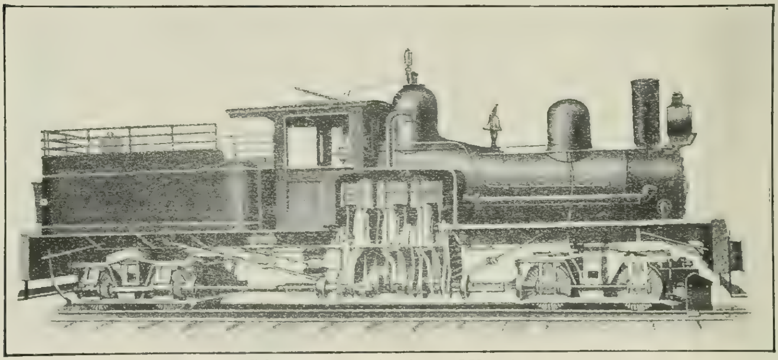

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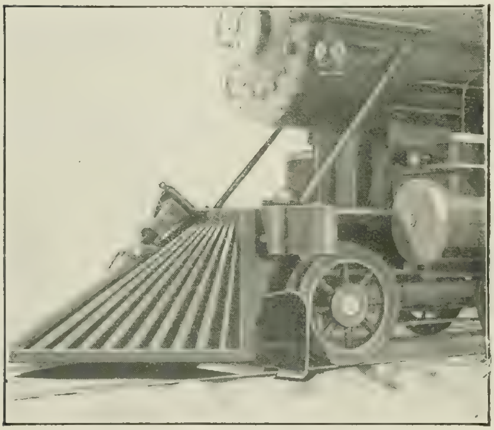

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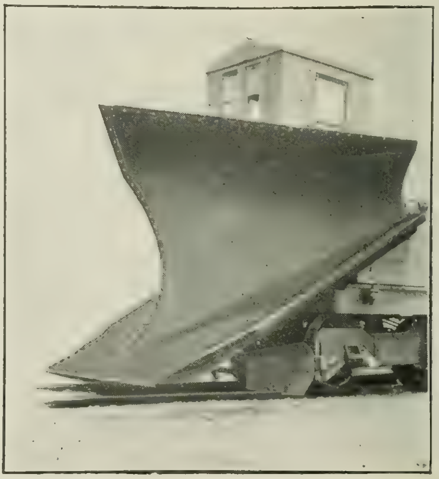

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the hopper car, carrying coal, ore, sand, crushed rock, earth, ashes, refuse, cinder, etc., which is discharged from a trestle or over a refuse bank.

The use of explosives to loosen frozen ore in cars, as mentioned by Mr. Lynn, could hardly be advocated as a good practice. All of you have noticed how the hopper and the body near the hopper has been damaged by blows from picks or sledges in the attempt to loosen the material. A wooden car under like conditions would be fit for kindling wood after one or two operations of this kind.

4.—Carrying hot materials corrosive solids or liquids, or saline materials.

A wooden car will not carry material which is hot enough to ignite the wood. A steel car is sometimes expected to do such work. Very little thought is given to the strains established at the joints or riveted parts. Iron will decay rapidly when subjected to corrosive fumes or saline substances. At the beginning of the decay it is considerably more rapid than wood, but the steel car must at times carry hot material which has been cooled by water, and is in a steaming condition, which is particularly favorable for rapid deterioration.

5.—Climatic Conditions.

Our atmosphere is not as pure as it was formerly. As the country becomes more thickly populated and industries increase, both the air and water become more impure. I was forcibly impressed by this fact in a study of atmospheric corrosion on the same steels tested near the sea, in a manufacturing locality, and in the country. The corrosion in the country was about one-half as rapid as in the manufacturing district.

Not alone is the rainfall more impure, but the water used in cooling hot material in a car comes from our rivers, which are not as pure as they were several years ago.

6.—Paint Protection.

Some paints are better than others. A paint that is good for covering wood is not necessarily good for steel. This fact is not universally known. Perhaps the best paint has not always been used in painting a steel car. This subject requires considerably study.

I have seen cars in which the paint on the body had peeled off, but where the initials or number had been stenciled with another paint, the different coats of paint adhered firmly.

If you examine some cars you will find where the paint has been washed off, others burnt off, stili others rubbed off. I have often thought it might be a good plan to galvanize the entire car to secure a protective coat which would stay, but I am not sure that even this will make the coating fool proof.

7.—Different Service demanded of Cars.

During their life no two cars are subject to the same influences. One car may wear out in five years another in twenty years.

A couple of years ago I was called into a meeting in which the subject of substituting a new, less easily corroded steel in building some steel cars was under discussion. It was the intention to build a number of cars of the new material and compare them with the regulai material. Believing the deterioration of a car was due to both wear and corrosion, I objected to this plan on the ground of the different uses to which the cars might be put, which would influence their life and not give the necessary information. The matter was settled by building a number of cars in which one half of the body of each car was built of each variety of steel.

Near the close of his paper Mr. Lynn says "The steel that is now being purchased and used for repair parts is inferior to the steel that went into the first cars built." This is rather a sweeping condemnation more especially when he publicly admits he knows nothing about the business. In another sentence he says "The fact remains that the steel plates that are being purchased and used for repairs are deteriorating much faster than the original sheets placed on cars." Such statements must come as a surprise to the manufacturer of steel plates.

To be publicly told he is retrograding in steel quality is a severe blow. In spite of more rigid inspection, more severe physical requirements and greater severity of service, we are told the steel is of poorer quality. I am sure if the consumers of steel over the country were asked if the steel they use today is inferior to the steel used twenty years ago, the great majority would unhesitatingly say that it is not.

While he says, "The fact remains, etc.", I believe this is simply a form of expression and that he bases his statement on his private opinion without considering all the evidence. The actual facts can be easily developed by any one if they will take plates, not severely damaged by wear or corrosion, from an old car, then use them in repairing a comparatively new car. If these old plates are then compared with the new plates in the same location in the new car, the results will show which is superior. Unless such work has been done, I can not understand why such a statement is made.

No one will deny that different cars receive different treatments, or that different parts of the same car receive different

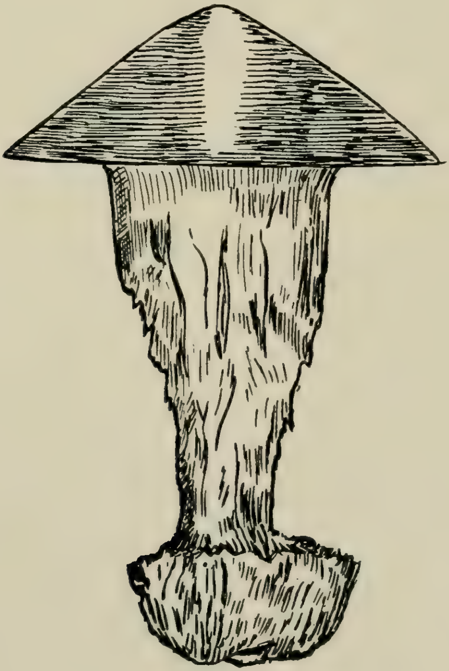

Figure 7

treatment. I hold in my hand an 1¼″ x 2″ rivet, which is a remarkable example of corrosion. The heads were originally 1½″ apart. The head least corroded was exposed to a stream of water, the opposite head to steam and hot gases from a coke fire. I present this merely to show that within a very short distance the corrosion on the same piece of steel may vary. A similar, but not so pronounced a result, could be obtained on different plates on the same car or by the same plate at different points, leading one to draw erroneous conclusions regarding the quality of the steel.

MR. SAMUEL LYNN: I believe the speaker agrees with me except in the last part of my paper where I refer to the steel plates we are using for repair parts. When referring to the steel I stated that I knew notihng about its manufacture and I did not want to leave the impression that I came here to discuss the physical qualities of steel. The point I wished to make was that the hopper type car, which was shown on the canvas, has been used for transporting the same commodities, such as coal, ore, limestone, etc., since the steel car first went into service. There has therefore been no radical change in the service conditions under which the first cars built have been operated, and both the older cars and the new cars are today being operated in the same service.

We have had the installation of the hump yards, which no doubt are more severe on the underframes of the cars in switching service, but both the old cars and the later cars are handled over hump yards, so that I cannot see where there can be any argument that the later cars are subject to more severe conditions than were the first cars built.

Getting back to the question of steel plates which we are using for repairs. The appearance of some of the plates used that have been on the cars only three or four years would indicate that they do not possess the lasting qualities of the original plates, and I believe there are men in this room who have to do with repairs on steel cars who may unfortunately be in the same position as I—they cannot say that the steel is of such and such a quality, but from a shopman's viewpoint the indications are that it will not last as long as the steel that went into the first cars built.

There may be conditions other than the composition of the steel that is responsible for this rapid deterioration but from a user's viewpoint the only explanation I can give is that experience has shown that we get from 12 to 14 years of service out of the floor sheets and side plates, while the appearance of the steel that has been used on some of the cars repaired would indicate that we will not get anything like that length of service.

On some of the cars shown on the canvas I showed you where the steel was worn through in different parts of the plate. As a general rule this takes place along the laps and seams while other parts of the plates are in fair condition. The pictures on the canvas showed, as has also been shown by Mr. Unger with his rivet, that because of acids or for some other reason the metal will eat away in spots, while but a short space away from where the metal is eaten through the sheet is in fairly good condition.

We all realize, as has been stated by Mr. Bihler, that steel cars will wear out, but we also feel that if we get from 12 to 14 years service from the steel plates used on the cars when they were originally built, there is no reason, with the cars in the same service, why the plates used for repairs should not give us the same service. However, the appearance of the plates used for repairs would indicate that we will not get that number of years service from them, and that was the point I wanted to bring out.

PROF. L. E. ENDSLEY, University of Pittsburgh. Mr. President and Gentlemen: When I found this paper on my desk today I pulled out some notes that I made last winter after a speech by Willard Smith, whom some of you men in the audience know. He made some statements last winter before a meeting in Chicago which probably will answer some of the questions that some of the men are asking about the different kinds of steel here tonight. He made the statement that he took these figures from the ten largest roads in the United States and that if they did not prove his statements correct, the men who made these estimates of their cost "are not truth-bearers, it is not up to me."

He was talking to a railroad crowd that night and he said that in the last ten years the capacity of freight cars had increased 34.19 per cent. This was the average capacity of all the freight cars in use and I think that is about what it would be. He said the average loads had gone up 28.54 per cent, almost keeping pace with the car capacity. But he said that the cost of repairs had gone up 67.85 per cent.

Now, I think if we had some figures—which probably we cannot get—in regard to how fast these trains we are hauling today go, and how much greater service we are getting out of some of our cars on long trains, and the larger cars, and some other things that are happening with our big cars—this 67.85 per cent would not be any greater probably if we had all new cars, or all cars were made to stand each other's service. So I think that if we should take the life of a wooden car today and its life 20 years ago, it would probably be less than it was twenty years ago.

I think that the steel cars of today are really being made too light in the underframe. Now, I say that with some hesitation because I have never built a car in my life. I have designed a good many in theory only. But I do believe that we should do one of two things. We should either not handle our cars so rough, or build them so that we can handle them as rough as we are handling them. We are making a mistake when we damage the underframe in switching it too fast, or the underframe is not strong enough, and I think the statement just made: that we are putting the same size studding on present day cars as on the original ones, is a fact we should take into consideration in designing these large cars because it is a known fact generally that when two cars came together with 100,000 pounds in each car they will have a certain load on them, on the side sheets, and those side sheets are going to be strained.

I am going to give you the result of some tests which I made last year on the Norfolk & Western cars at Roanoke, Virginia. I measured pretty accurately the impact coming between two cars in switching service and I measured that by obtaining the acceleration of the cars with a chronograph arrangement that was very accurate, I think, up to six miles an hour empty and up to 3.8 miles an hour loaded. I received over 800,000 pounds. That may be a surprise to some of you men. Also I did the same work on some cars in the Conway Yard of the 100,000 pounds capacity Pennsylvania cars, and those cars going together, loaded, at four miles an hour, will give you over 460,000 pounds pressure.

I made that statement at the Master Car Builders' convention last summer and I was attacked by several railroad men who said I didn't know, probably, what I was talking about, but Mr. Crawford came to my assistance and said their Company had conducted some tests with a dynamometer car some years ago that showed the impact force was approximately 100,000 pounds per mile per hour up to about 600,000 pounds, when the capacity of the dynamometer was reached. So that, gentlemen, the life of a steel underframe, or the life of a car, is going to depend upon the forces which we put on it in switching service and other services, and I think—and I said last week before the Car Foremen's Association at Chicago—that one of the influences which racks and tears our steel cars up so much is due to the fact that we put in that car a draft gear that we expect to last the life of the car. It is just as absurd, in my opinion, o say that we could put a brakeshoe in that car that would last the life of the car, because the brakeshoe wears out and we put in another one. The draft gear is put in there for exactly the same thing: One stops it by adhering to the rail, the other stops it by keeping it from hitting another car so hard.

Now, I think the repairs of cars will be materially reduced when you wake up to the fact that the draft gear is put there for the purpose I mentioned, and that we should maintain it without lost motion and without reducing its efficiency, and then when we do maintain our draft gears the same as we do our brakeshoes, we will have the life of a steel underframe prolonged a great deal.

THE SECRETARY: Gentlemen: We are sorry to announce that Mr. Lynn, the author of the paper of this evening, had a death in his family day before yesterday, and at this time asks to retire from the meeting.

PRESIDENT: We are sorry to hear of Mr. Lynn's bereavement. No doubt, there are several gentlemen present who will further discuss Mr. Lynn's paper.

MR. F. R. McFEATTERS, Superintendent, Union Railroad: I do not have anything to say on this subject except in line with Prof. Endsley's remarks in regard to the speed of switching and bumping the cars. In my opinion, the loading and unloading of the car does more damage. I find that the cars we load frequently require a great deal more repairs than cars that are handled farther and not loaded so frequently. I think there is more damage to a car in loading and unloading it than most of us figure on.

MR. A. STUCKI: First of all I want to compliment Mr. Lynn on the paper, he has presented here tonight. We all agree, that there is no other subject more important than this. He said something about not being a good speaker, but one should not take that seriously, and the paper proves conclusively, that no apologizes are in order.

Mr. Lynn in the first pargraph says, that the most important item is the design of the car. He is very right about that and whenever we ignore this, harm is sure to follow.

In the same paragraph but further down, the author says something about draft sills, which failed after the second loading of the car. Gentlemen, that is pretty serious and a great mistake must have been made by somebody, but the question is, who made it? Was it an oversight or undue composition? It reminds me somewhat of the good old times, when we started with steel cars and had to compete with the wooden cars, which cost about $600 apiece, while a steel car, properly built, would have cost about $1000. Therefore our pioneer, Mr. C. T. Schoen was compelled to design the cars as light as possible and even that did not bring it down in price sufficiently. The Superintendents of Motive Power had nothing to go by, which would justify them to pay out a few hundred more dollars per car and the steel manufacturers themselves had to come to the rescue and had to make a special price for steel, so as to enable us to introduce the new competitor alongside the cheaper and well established modern car. Here a light design was not an oversight but an unfortunate necessity.

Today the conditions are entirely different. The steel car has now proved its case, it is established and there is no more necessity to compare its first cost with that of a modern car. On the contrary, every superintendent of motive power gladly admits, that it is true economy, to put the proper amount of steel into the various details, regardless to first cost, and for this reason gentlemen, we build today a far superior steel car compared with that of eighteen years ago. The cross-sectional area of the centre sills for instance is now more than twice as great. The sheets are heavier, and heavy angles all along the side sheets at the top have found to be a good investment, etc. In other words economy in the long run is considered more important than merely a low first cost.

Another case of undue competition comes to my mind. A manufacturing concern, with whom I was connected at the time was after a large order of a miscellaneous car detail; but the price the customer stated, was too high to let the order. Our general manager then conceived the idea of cutting down the weight and I had to get busy to determine the strains and stresses. I did it with great care and mathematical precision. I then was asked, whether this design would stand up and I answered with a statement, that it would, but that it would not last as long, depending largely on the maintenance it would receive. The design was lightened up and went into the service.

With this in view the thought struck me that in designing the above mentioned draft sills, similar abnormal conditions may have existed, which naturally would take the control away from the designer and for this reason I asked a little while ago, who made the mistake?

Such undue competition, or rather abnormal competition, does more harm than anything else I know of. It not only destroys economy in the long run and shortens the life, but it also minimizes safety. Just look at the cast iron wheel conditions, we have today.

Another very serious handicap regarding the life of a car is the rapid change in service conditions. The author in the first paragraph says: "Care must be taken to get the required strength in the underframe in order that the car may withstand the shocks incident to present-day transportation." These transportation conditions today are entirely different from what they were 18 years ago. The trains are heavier and longer, are run at higher speeds and naturally are exposed to much more and much greater shocks. The tractive force of a locomotive is nearly twice as great and the hump yards, then unknown, add their full share to the destruction. The first steel cars were built to stand the transportation of those days. Now they are greatly weakened from the service during nearly two decades and still they are compelled to run in service nearly twice as hard as that ,for which they were designed. Is it not a wonder, that these steel cars last as long as they do?

After the design, the maintenance is no doubt the most important item, to prolong the life of a steel car. When we first started out eighteen years ago we found, that in France steel cars had an excellent record as far as the life was concerned. So much so, that we easily could count on forty years.

It was not overlooked, that these foreign cars received periodic inspection and careful overhauling, whenever needed and their service conditions are much more favorable than ours. Again their couplers or drawhooks are tightened up, until the buffers are under an initial compression doing away with the constant racking between the car ends. The other extreme in the life of a steel car exits, when the cars are used as storage bins for coal in the yards or on the sidings. Here I have seen cases, when the sulphur drippings cut out large holes in the floor sheets, rendering the cars unserviceable in a few months.

Between those two extremes, we have to choose a happy medium, one that will pay the best, will bring the largest returns for the money spent. We know it would not pay us to shop the cars too often, to look them over, to sandblast them and to apply new paint, although we know, we could prolong the life that way almost indefinitely. It would not pay us as we could not get the service out of the equipment as we now do.

No doubt, we as a rule go too far in the other direction and whenever I see a train pass, it reminds me of a regiment of soldiers. Some cars have burnt spots in their sheets, just like sore skin, sometimes the paint is peeling off, reminding us of ragged clothes. Quite often cars are rusted all around, sheets half worn through and the general appearance that of having been worn out. Stakes are bent, knocked out of shape, and other members twisted, making a regular cripple of the car. The hopper and the side sheets show distinct marks of the mallet and the sledge, the crowbar and of dynamite, so often used to hasten the unloading, and to push the car back into service without a minute rest. The soldiers we send to the hospitals, but our cars are urged on and on until some merciful soul tags them "shop" on a technical charge of some kind.

"Hurry up methods of the contracting builders" are mentioned by Mr. Lynn as being the cause of a good deal of trouble. No doubt this is the case as far as painting is concerned but otherwise quick methods are a blessing and it is largely due to the efforts of the car companies, that we can build a car much better and in less time than we could some years ago, owing to improved machinery and better methods.

Some of the cars shown on the screen were of a special design, samples which were built by the various parties in the nineties, to show, how steel could be utilized in car constructions. They were built of heavier material than the commercial car of that period, and their present condition proves again, that we are justified in building the modern cars with a greater factor of safety, or of heavier steel. This way to a large extent we compensate for inadequate painting and for future, harder service and for this very reason the steel cars, as they are built today, will have a longer life than those, we built twelve years ago.

As for the steel being inferior for repair parts compared with the steel, that went into the first cars, Mr. Lynn was possibly guided by the appearance of the repair material, after it was laying in the yard for months and years, exposed to all sorts of weather, temperatures, mud, etc. Then it is taken to a forge and flanged and pressed and hammered in a primitive way. The metal in such cases is no doubt quite often burnt and we should not wonder at inferior results. But generally speaking there is no evidence, that the steel we get to-day is not as good or better than the steel of fifteen years ago.

There are good many railroad friends sitting right in front of me, who had to take care of these cars through all these years, and their experience, I am sure, would be interesting and instructive.

MR. C. E. POSTLETHWAITE, General Sales Manager, Pressed Steel Car Company: In the old days in railroad societies it was the practice to write a letter in a circle. It started at a certain point and came back to the same point without saying anything, but the latter day methods are much more explicit, and Mr. Lynn has given us a wheel, you might call it, the rim of which is built of solid information which comes to the man who has these cars to deal with. The rim is connected by spokes to a hub—and it is a good strong hub in his paper, and all other things lead to it. I read his words:

> "If the steel car was given reasonable treatment and repairs made when needed, and repainted when the steel bcame exposed to the weather, the renewing of some of the parts would not become necessary for a longer period than is now the case."

That is the substance of the whole thing, and to take care of the car properly, most of the so-called troubles will disappear.

The life of a steel car is one of the most discouraging things that a car salesman has to deal with. Believe me, I know what I am talking about; they last entirely too long.

The best way to figure that, and it is one of the most discouraging questions that a car salesman can ask, is to say to some railroad man, "How many steel cars, have you bought?" And he tells you. Some of them go up into the hundred thousand numbers. "How many have you lost?" Most of them figure less than 20. One railroad man whose road had nearly 200,000 steel cars just a few years ago, I think their exact number at that time was 180,000, commented to me by way of consolation that they had lost only twenty of the entire lot, and two of the twenty had dropped off of a float in New York and went to the bottom of the river, and they didn't think they could recover them.

BY A MEMBER: Don't the dynamite help you any?

MR. POSTLETHWAITE: I was just going to refer to it. Unfortunately Mr. Bihler has left the room, but some seven to ten years ago, Mr. Bihler and I fought out that question of dynamite right here in the club and I referred to a case, viz., a railroad sent a message to the works: "Those steel cars you built for us are bulging." Well, we couldn't think why they were and we sent a man to investigate and we found that one of the furnaces was getting the cars loaded with frozen ore the easiest way to loosen up the load was to use a stick of dynamite.

The Steel Company and others got after it and I do not believe they are using dynamite today. If they are they are doing it very carefully.

The life of a steel car as stated by Mr. Lynn from information given him by others ranges from "eight to fifty years." That is surely sufficiently elastic, and in mentioning that one point in his paper he said, "Life depends entirely upon the use of it." When the use of anything is abused you do not get the best results. Steel cars are built for transportation of coal, limestone, ore and other products, but when they are used as storage bins, certainly the railroad should pay the storage bill.

Now, a great deal has been said about the designs, and while the design was entirely in the hands of the car manufacturers in the early days, today nearly every railroad has its own design and the car is built in accordance with prints and very definite specifications, sent to the builders, and the ideas of the railroad people are carried out. The tendency is to build a heavier and stronger car.

When I first went into the steel car building business, just a few months after the first steel cars had been built by the Schoen Pressed Steel Company, many of our railroad friends coming along and looking over the cars for the first time would shake their heads. These were motive power men too. And they said, "I am afraid of them. Those cars will rust out in less than three years and it would not be possible to repair them." Now, it seems absurd to mention things like that today because they are not rusting out and the railroads are all repairing them and going along very smoothly, but we figured at that time that, taking the steel car with its increased capacity, even if it did rust out and they lost a whole car in three years the additional revenue derived from the increased capacity would pay for the car. So, why bother about the life of a steel car; you get the money back so quick?

In connection with the shocks, usage, etc., given steel cars today, we have had a most interesting experience in that respect with some cars being built for Russia. I think Mr. Howe could tell us in a few words about that unusual test.

MR. HARRY HOWE, Inspector of Castings, Pressed Steel Car Co., Mr. President: It was my fortune to be one of the parties connected with the tests Mr. Postlethwaite speaks of.

The Pressed Steel Car Company is nearing the completion of an order of 7,000 cars for Russia—2,000 box cars and 5,000 gondolas. These cars, outside of the coupling features, are American cars, built from American designs and in every way a good example of American car building practice.

It was the idea of the engineers who are in this country for the Russian government to submit those cars to a buffing test, a test we hadn't often applied to American cars. Of course their couplings are different from ours and they have a spring buffer on each corner of the car.

We rigged up two flat cars to suit their couplings, on one end each, put one of their gondola cars and one box car in between these two flat cars, coupled up an engine on one end, and thirty-one loads of coal, approximating over 2,000 tons, ran the train down on a straight track until we got to a speed of twelve miles an hour, cut off the engine and the four cars, that is, the two flat cars which were light and the box car and gondola car, which were light, ran ahead and brought those cars to a stop about 15 car lengths ahead of the loaded cars and let the loads come down against them.

Now, gentlemen, cars that will stand shocks like that without damage will stand practically any service you choose to put them to, and I will stand back of the statement, and so will everybody else connected with the Pressed Steel Car Company, that there can be no fault in the design of a car that will stand that particular shock.

MR. A. G. MITCHELL, Superintendent, P. R. R.: I do not know anything to add about the life of a steel car but do know that it is a mighty good one for use on account of its larger capacity which enables one to haul a train load of freight in fewer cars than formerly when wooden cars were used exclusively.

PRESIDENT: Are there any others who care to take part in the discussion? If not, a vote of thanks is in order.

MR. POSTLETHWAITE: Mr. President and Gentlemen: It is a matter of great regret, to all of us and undoubtedly also to Mr. Lynn that he was unable to remain for all of the discussion of this subject in which he is so deeply interested. But with a death in his family he was certainly most kind to appear at all this evening, and I move that we extend to him a rising vote of thanks for his most interesting paper which has brought out a discussion of interest to all of us.

Motion seconded by Mr. Unger and carried.

MEETING ADJOURNED.

J. B. Anderson
Secretary.

NOTE:—The discussion brought out on this subject after Mr. Lynn left the meeting has been reviewed by him to which he does not care to add anything further.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of December, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.
SUBJECT—Annual Christmas Entertainment.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.
SUBJECT—"Efficiency in Track Work" by S. L. Connor.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.
SUBJECT—"Pure Iron, Its Use by Railway Companies" by J. T. Hay.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.
SUBJECT—"Development of Tubes" by C. F. Roland.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.
SUBJECT—Annual Meeting.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.
SUBJECT—(not obtained)

Ceneral Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.
SUBJECT—(no meeting during month of December)

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.
SUBJECT—"The Life of a Steel Freight Car" by Sam'l Lynn.

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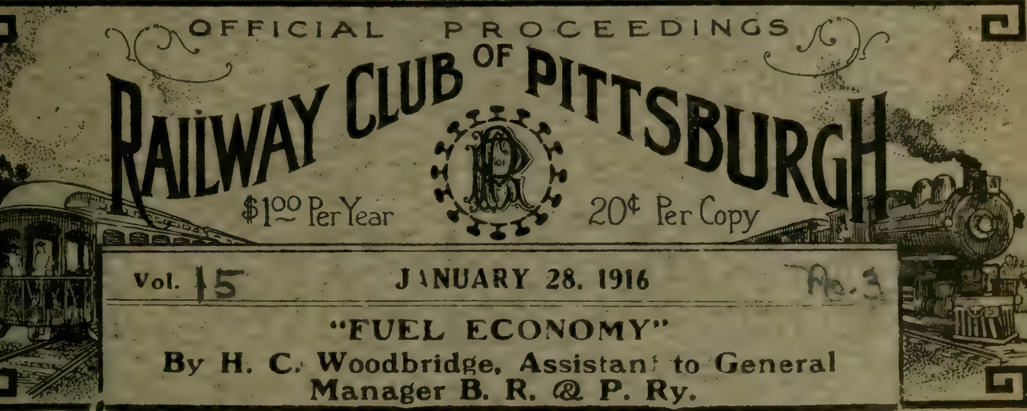

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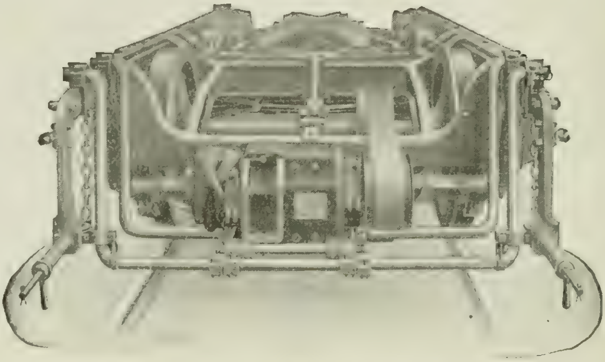

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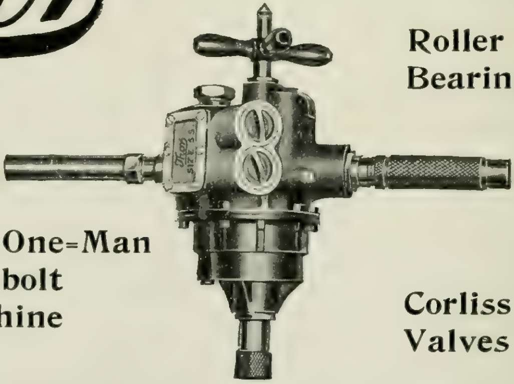

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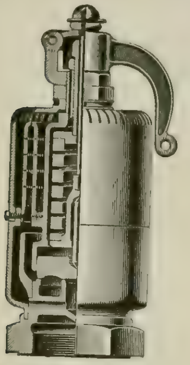

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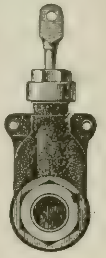

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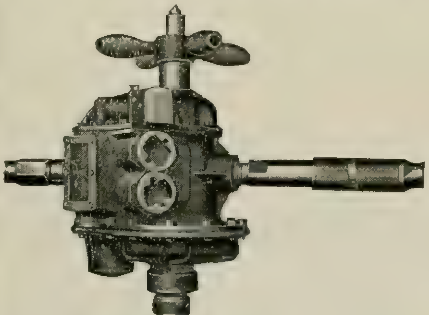

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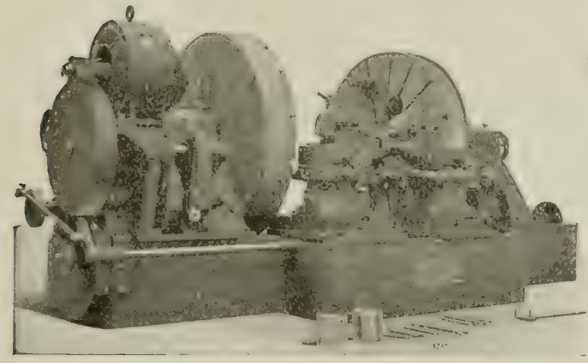

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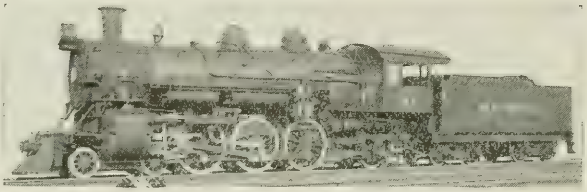

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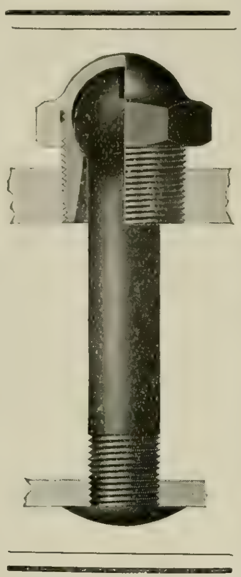

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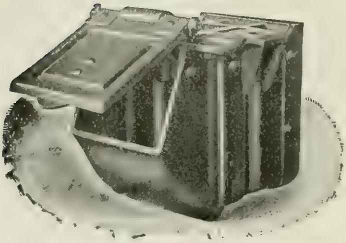

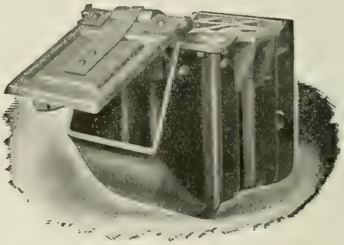

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Pittsburgh, Pa.

A. STUCKI,
Engineer,
Pittsburgh, Pa.

R. L. KLEINE,
Chief Car Inspector, P. R. R.,
Altoona, Pa.

FRANK J. LANAHAN,
President, Fort Pitt Malleable Iron Co.,
Pittsburgh, Pa.

HARRY HOWE,
Insp'r. Castings, Pressed Steel Car Co.,
McKees Rocks, Pa.

Entertainment Committee

STEPHEN C. MASON,
Secy., The McConway & Torley Co.,
Pittsburgh, Pa.

R. H. BLACKALL,
Railway Supplies,
Pittsburgh, Pa.

D. H. AMSBARY,
Dist. Manager, Dearborn Chemical Co.,
Pittsburgh, Pa.

Past President

J. H. McCONNELL	October, 1901, to October, 1903.
L. H. TURNER	November, 1903, to October, 1905.
F. H. STARK	November, 1905, to October, 1907.
* H. W. WATTS	November, 1907, to April, 1908.
D. J. REDDING	November, 1908, to October, 1910.
F. R. McFEATTERS	November, 1910, to October, 1912.
A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING, JANUARY 28, 1916.

The meeting was called to order at 8 o'clock P. M. at the Monongahela House by President F. M. McNulty.

The following gentlemen registered:

MEMBERS.

Amsbary, D. H.
Anderson, A. E.
Anderson, J. B.
Andresen, A. M.
Babcock, F. H.
Barth, J. W.
Battinhouse, J.
Bauer, A. C.
Bell, R. P.
Blackall, R. H.
Bosley, N. D.
Botsford, C. F.
Boyd, D. H.
Buckbee, W. A.
Buffington, W. P.
Calvin, A. W.
Chapman, B. D.
Chester, C. J.
Chilcoat, H. E.
Clark, C. C.
Conner, W. P.
Code, J. G.
Cooper, F. E.
Copeland, T. T.
Cotton, A. C.
Courtney, D. C.
Cunningham, R. I.
Doty, W. H.
Eckstein, J. E.
Emery, E.
Evans, E.
Ferren, R. O.
Fields, A. C.
Forcier, C. H.
Fulton, A. M.
Geary, J. J.
Glassburn, S. G.
Grewe, H. F.
Grieve, R. E.
Gross, C. H.
Gyllenflycht, F. E.
Hankele, E. W.
Harsch, A. M.
Haynes, J. E.
Henderson, J. W.
Hill, J. F.
Hoffman, C. T.
Howe, D. M.
Howe, H.
Huchel, H. G.
Hudson, W. L.
Hyndman, F. T.
Johnson, W. A.
Kelley, H. B.
Kinch, L. E.
Knickerbocher, A. C.
Krepps, T. S.
Lanahan, J. S.
Lansberry, W. B.
Laughner, C. L.
Lawley, R. N.
Lidstone, F. J.
Lobez, P. L.
Loughridge, H. W.
Lynn, Saml.
Marcus, M.
Marshall, W. T.
Matchett, H. K.
Mathias, D. L.
Maylock, E. A.
Maxfield, H. H.
Mitchell, A. G.
McCauley, Wm.
McGhee, W. S.
McKinstry, C. H.
McNulty, F. M.

McVicar, G. E.
Neal, J. T.
Newbury, E. H.
Painter, Jos.
Patterson, J. E.
Pennepacker, N. W.
Pfeil, John
Pie, J. J.
Pratt, I. D.
Proven, J.
Rabold, W. E.
Reynolds, T. A.
Reymer, C. H.
Richardson, J. A.
Richardson, L.
Robbins, F. S.
Rohn, W. B.
Root, R. R.
Schaaf, A. J.
Schaich, W. L.
Scott, R. T.
Scheck, H. G.
Shaner, E. L.
Shaffer, G. E.
Sleeman, W. C.
Slutzker, Jos.
Snyder, J. R.
Snyder, J. W.
Spielmann, J. A.
Stall, R. L.
Stark, F. H.
Stucki, A.
Stumpf, F. L.
Suhrie, N.
Swope, B. M.
Trappe, W. C.
Travis, J. H.
Turner, L. H.
Wagner, E. A.
Waggoner, R. E.
Wardale, N. H.
Watkins, G. H.
Wegener, H.
Wharton, J. E.
Wilder, H. W.

VISITORS.

Braun, F. R.
Brennan, E. J.
Brennecke, C. C.
Brown, W. P.
Cap, E. E.
Cesscoe, C. S.
Davis, J. J.
Doran, W. J.
Faddis, J. S.
Farmer, F. B.
Feather, G. E.
German, P. F.
Gray, L. M.
Guilfayl, F. G.
Henry, J. W.
Kelley, H. T.
Kinch, D. S.
Lehman, A. C.
Llewelyn, W. R.
Logan, F. M.
Myers, C. E.
McCollum, W. H.
Osbourne, A. S.
Peck, C. B.
Poorman, S. L.
Rankin, T. H.
Rorabaugh, R. M.
Sevier, C. J.
Sauser, G. W.
Spellen, Jas.
Stacee, T. J.
Stenson, G. A.
Swetland, W. R.
Ulmer, Chas.
Wambaugh, R. H.
Wright, J. B.

The reading of the minutes was dispensed with, the printed Proceedings being ready for distribution.

The Secretary read the following list of applications for membership:

Herman, J. A., Purchasing Agent, Spang, Chalfant & Co., R. F. D. No. 2, Box 193, Sharpsburg, Pa. Recommended by W. H. Ritts.

Hewitt, E. E., Draftsman, Westinghouse Air Brake Co., 221 Vine Street, Edgewood, Pa. Recommended by R. N. Lawley.

Llewelyn, W. R., Inspector, Westinghouse Air Brake Co., 654 Middle Avenue, Wilmerding, Pa. Recommended by J. Battinhouse.

Weiss, Chas., Civil Engineer, Penna. R. R., 5715 Howe Street, Pittsburgh, Pa. Recommended by T. L. Shourek.

PRESIDENT: As soon as these names have been approved by the Executive Committee the gentlemen will become members of the club upon payment of their dues.

The Secretary announced the death of J. J. Toomey, Representative of the Ball Chemical Company.

PRESIDENT: A proper memorial minute will appear in the issue of the official Proceedings of this meeting.

If there is no further business to come before the Club, we have as the speaker of the evening Mr. H. C. Woodbridge, Assistant to General Manager of the B. R. & P. Ry., who will read a paper on "Fuel Economy." It is now my pleasure to introduce Mr. Woodbridge.

FUEL ECONOMY.

By H. C. Woodbridge.

When considering the preparation of a paper on the subject assigned to me for this evening, I found myself constantly confronted with the apparent impossibility and possible impropriety of adequately treating any one of the many kindred and dependent items. I was reminded of a line from a play which was very popular a few years ago: "To drain life's quintessence in an hour, give me the days when we were twenty-one." To exhaust this subject in an hour, we must forget our experience and instructions since we began firing, or since we became familiar with fuel uses other than those of our mother's cook stove.

So I accepted the problem as one of drastic elimination, which at once prohibited me from including data on some particular hobbies of my own, as well as on the more important features, fixtures, attachments and methods, which are of vital interest to all fuel economists or those responsible for operating economies. However, I am happy in the knowledge that those of you who will discuss this vital subject, may specialize as you like, and that it is only necessary for me to place the subject in your hands to insure a pleasant and profitable meeting.

As matters of particular import to the fuel economist, I would suggest boiler and engine design, construction, maintenance and operation, upon which many excellent treatises have been prepared. But to be more specific, let me recommend superheating apparatus, brick arches, combustion chambers, draft regulation, feed water heaters, condensers, re-heaters, stokers, the selection, preparation and storage of fuel, including both powdered and liquid combustibles, valve gears and setting to insure proper steam distribution, the elimination of unnecessary fires, particularly in locomotives not required for service within twenty-four hours, fuel records and accounting, smoke consumers and precipitators, electrification lubrication, which item brings to mind a condition, frequently encountered in departmental organization, which is inimical and in some instances disastrous to fuel economy. I refer to the unfortunate practice, prevalent to a large degree in railroad accounting, which removes from the Mechanical Department ledger all traces of expense for locomotive fuel, and at the same time records the expense for lubricants on that ledger so conspicuously that the important and direct relation to economy in fuel is lost sight of, and even proper analysis of repair costs is overshadowed and therefore neglected. Study also the requirements necessary to avoid stopping or retardation to the movement of trains, which interference is responsible for great waste of fuel, and finally, the selection, training and supervision of men, upon which three sub-divisions I solicit your indulgence for a moment.

One writer says, "Only too often a fireman is chosen for his muscle, low wages and ability to endure high temperatures existing in the fire rooms, and little or no attention paid his intelligence."

In both Germany and Great Britain, schools are maintained for the instruction of firemen, and much emphasis is placed upon the skill of the individual in handling his fire. They find that it is better to employ a competent man at a reasonable wage than it is to employ an incompetent man at a low wage.

In this way, they avoid the necessity for additional supervision, numerous incidental annoyances, the consumption of a larger quantity of coal and the production of unnecessary black smoke.

In 1907, three hundred firemen had been especially trained by the officers of the Hamburg Society for Prevention of Smoke. A report of this society shows thermal efficiency with the regular but untrained firemen 66.6%, and thermal efficiency of the same plant with trained firemen 72.7%.

These statements, while referring particularly to stationary practice, indicate methods thoroughly applicable to locomotive operation, as is proven by results of experiments conducted in the Pennsylvania Railroad Company's laboratory at Altoona under the direction of Professor Goss—in which series of tests the efficiency of a locomotive boiler was 73.2% when fired by experienced men, and 59.7% when fired by inexperienced men, and the dry fuel per dynamometer horse power hour was 3.9 pounds with experienced firemen and 5.2 pounds with inexperienced firemen.

We must have efficient supervision for we all need inspiration, assistance and some discipline lest we become plodders with low aim and little interest.

I would not hazard an estimate of the enormous fuel as well as other losses due to lack of proper and adequate supervision and the result of supervision by men whose vision and actions are confined by sub-normal limitations of the brain and heart.

To obtain, even approximately, the possible economies, cooperation and interest on the part of every man in the ranks as well as the officers is essential. Low grade supervision is responsible for much of the indifference and vicious antagonism encountered in our men; and selfishness, conceit and lack of foresight and education are responsible for most serious delays.

Where would our vaunted supremacy be if every one had carefully obeyed the old adage, "Be not the first by whom the new is tried?" And worse still, imagine the transportation inefficiency from which we would now be suffering, had not a few men of foresight and strength, fairly jammed the super-heater and the stoker, and the modern locomotive down the throats of the majority of men in responsible official positions on our railroads.

I sat in the Master Mechanics Association meetings back in 1906-7 when the forceful and eloquent pleading of Mr. H. H. Vaughn in favor of super-heating our locomotives fell principally upon barren ground. The development and application of super-heating apparatus has reduced, by at least one-fifth, the fuel consumed in service; and this apparatus designed primarily to reduce fuel consumption has simplified the important problem of increasing the earning power per old unit with a liberal decrease in cost of operation and by materially increasing the possible boiler capacity within the limits of size and weight to which our designs must conform, it has, together with the stoker, made possible and efficient the modern power plant on wheels and thus averted more than one crisis.

There is another fuel, upon the conservation or best use of which our progress and perhaps the very existence of our country may depend. I appeal to you to promote development which will insure against waste of this, the most valuable fuel that ever was or ever will be mined. I refer to the elements which burn in the mind and heart of the progressive man. There has been a tremendous and cruel waste of this fuel in the super-exhaustion enforced on many such men by self-satisfied and narrow men in authority, who have strangled incentive and initiative in their associates until cultures of "What's the use" germs have developed everywhere.

The manager or superintendent who fails to make the most of the corrective and creative power in his sub-ordinates and associates—and these include the specialists and all-around experts in the employ of those concerns which serve the railroad trade, has failed to take advantage of his greatest opportunities.

If you encourage initiative in others and aid in the development of their thoughts, you will strike at the heart of the disease, which at times cripples our fuel as well as other economy efforts.

I commend to you a paragraph from one of the best prayers I ever heard:

> "O God! Keep us from narrow pride in outgrown ways, blind eyes that will not see the good of change, impatient judgments of the methods and experiments of others."

— DISCUSSION —

PRESIDENT: Gentlemen, the paper is open for general discussion and we hope you will all take part.

MR. A. STUCKI: I do not know, why I am getting up, unless it be to give the other members a chance to think it over. Mr. Woodbridge is certainly to be congratulated on the choice of the subject and the way it was presented, and we all regret that time did not permit him to go more into details.

We all know, that he has a great deal of data and experience in the various lines and sub-divisions enumerated in his paper. For instance regarding smokeless regulation I remember that some time ago the Railway Age Gazette published an article on smoke box dampers as tried out by the road, with which the author is connected and we certainly would like to hear something about this detail.

The paper also mentions lubrication. In this connection I recall the controversy between the use of slide valves versus piston valves. We know the latter type is not always as tight, as it might be, while with the slide valves we had no such trouble until we used high pressure super-heated steam. Since then the lack of proper lubrication on the contact surfaces has been annoying and for this reason I would like to hear the author dwell a little on a new method of lubricating slide valves, of which he had a great deal to do.

PRESIDENT: Mr. L. H. Turner, Supt. Motive Power of the Pittsburgh & Lake Erie R. R., may be able to tell us something.

MR. L. H. TURNER: Mr. Woodbridge, in his very able and interesting paper, has, in connection with the subject for the evening, mentioned a half-dozen others, all of which are equally as interesting and important, and any one of them could be utilized for a full evening's discussion, and then not exhaust the subject.

Pertaining to fuel economy, it has been one of my greatest efforts to increase the mileage per ton of coal consumed. Train loads have been increased, locomotives have grown larger, but it is interesting to note how little change has taken place in the amount and value of the fuel required to move a ton of freight one mile, in comparing the performance of thirty years ago with the present time, and when you stop to think that a revenue ton in one of our modern freight trains is hauled a mile for 3/1000 of one cent, it would seem that we might exercise our activities in other directions where the results to be obtained were much greater. If, for illustration, something can be done to increase the hauling capacity of the locomotive, either in the locomotive itself or in reducing the friction in the wearing parts of the car, we can earn money for our company much faster than by devoting our time to bringing about a saving of the small amount of coal which would be possible. For illustration, the average earnings of railroads throughout the United States are about six mills per ton mile. If we could add 100 tons per train, in a 100 mile haul, we could add $60.00 to the revenue of that train. This amount would pay the entire expense for the engine and train crew, locomotive maintenance, and pay for the fuel consumed, so it is quite apparent that while all reasonable efforts should be made to save as much fuel as possible, that there are still greater possibilities in other directions.

Many claims have been made as to the greatly increased efficiency and coal saving properties in the superheat locomotive. So far as I have been able to ascertain, it has not yet been definitely decided as to how much can be credited to increased efficiency, and how much to fuel saving properties of the superheat locomotive.

I presume that Mr. Woodbridge has given this matter much thought, and would be glad to have him say as to what the relative saving in fuel is, as between a superheat locomotive and one operated by the use of saturated steam.

PRESIDENT: May we hear from Mr. J. G. Code, General Manager of the Wabash Pittsburgh Terminal Railroad?

MR. J. G. CODE: I enjoyed the address very much. I have no particular argument in mind just now to advance or question to ask, but I would like very much to get the information that has been asked for, and also a little further elaboration of several of the points brought out in the paper. Mr. Woodbridge has sought brevity where we would have been glad to listen to him a much greater length of time.

PRESIDENT: Mr. W. A. Buckbee, representing the Locomotive Superheater Company, we would like to hear from you.

MR. W. A. BUCKBEE: Mr. President and Gentlemen. The manner in which the author of the paper has touched upon the various devices, having a direct bearing on the subject of fuel economy, seems to indicate that it was his intention to promote a discussion among railroad men, that will take in the superheater as well as other fuel saving devices now in general use.

Those who are acquainted with Mr. Woodbridge, know that for years, he has made a special study of fuel economy and if you will pardon me I will relate a little incident, that has probably had much to do with his giving so much attention to this important subject.

About thirty years ago I entered the railroad service as a locomotive fireman. I was not, at that time, particularly interested in saving coal, but as I was rather light for the job, I soon saw that a knowledge of combustion was of great assistance to me in firing and early in the game I began to study fuel economy and to apply it to my work.

One day our engine was assigned to a work train which was cleaning out ditches on the outskirts of a small town up in New York State and while waiting for the men to load up the cars, I noticed a young fellow looking over our engine very carefully. Finally he said to me, Mister, if I get you a nice big pail of cherries will you let me ride on that engine. I said, certainly, you get the cherries and you can ride on the engine all day. He started down the track on a run and in about half an hour, came back with the cherries and I can assure you he knew where to get good ones.

The cherry incident resulted in an acquaintance and for several years after, during which time I had become an engineer, that young fellow, occasionally rode with me on the engine.

His whole interest seemed to be in the locomotive and I found it a great pleasure to talk engine with him, when ever we met. During vacations he spent most of his time firing an old-time hook-motion engine that ran on a small road near where he lived. After finishing school, he went through college and then branched out in the railroad game and you have him before you this evening, the author of the paper.

More attention has been given by the railroads, to the subject of fuel economy in the past few years, than ever before.

During the recent depression, railroad men have had an opportunity to study the question and they have taken advantage of the superheater and other devices, which has enabled them to increase the economy and efficiency of existing locomotives and to design and build new locomotives that are not only economical in their operation, but far more efficient and of greater hauling capacity than was thought possible a few years ago. The results are being shown, in increased earnings since the resumption of business.

PRESIDENT: Mr. H. H. Maxfield, Master Mechanic P. R. R.?

MR. H. H. MAXFIELD: The subject of fuel economy, to me divides itself into two parts; first, design, and second, supervision of the operation of the locomotive. The design of the firebox, ashpans, boilers, cylinders, valves, etc., the application of the superheater, brick arch, etc., all enter into the matter of fuel oecnomy. There is no doubt that the records of every railroad that has gone into these latter devices will show there is a great economy in same. The information that has been obtained from tests, especially on the locomotive testing plants, show conclusively that design is vital in regard to fuel economy, as well as boiler capacity.

There are great possibilities of fuel economy in the proper operation and maintenance of the locomotive, and there are just two ways of obtaining that: first, by demonstrating to the men who are operating and maintaining these locomotives how it should be done, and then providing adequate supervision to insure that it is being done. The amount and character of the supervision that is necessary to produce the desired results is debatable, and worthy of discussion. Personally, I believe it depends not only upon the number of locomotives and men involved, but also very much upon how often the men should be checked up to be sure that they are doing their work properly. I think these are two important features of the paper which are worthy of discussion.

PRESIDENT: Mr. C. B. Peck, Associate Editor, Railway Age Gazette.

MR. C. B. PECK: I do not think I can add anything to the very excellent paper presented by Mr. Woodbridge. There are one or two points, however, that struck me as being worthy of special consideration, one of them is the feed water heater. I do not know that any one in this country has worked that proposition out to a practical basis. A great deal of experimenting has been done, for instance on the C. P. R. by Mr. Vaughan; on the Central of Georgia by Mr. Gaines, and some figures I think have been presented before the American Society of Mechanical Engineers, showing savings of 6% to 12% by the use of the devices that they have developed. I do not know how successful the particular devices have been but I believe there is a future in the feed water heater. It may even involve some changes in the design of locomotives. Mr. Woodbridge I think covered that point in the conclusion of his paper.

Another thing that Mr. Woodbridge mentioned, the fuel that burns in the minds and hearts of men. That is a fuel that has been almost overlooked. I believe that if more consideration had been devoted to that subject in the past as is being given to it at the present time, a good many difficulties the railroads and our industries are facing might have been avoided.

PRESIDENT: Mr. A. J. Schaaf, Chief Engineer Marine Department, Pittsburgh Coal Co., may we hear from you?

MR. A. J. SCHAAF: Mr. President, I do not know that I have much to say. I would like to hear the question answered as to what percentage is saved by the superheater, as well as what railroads are using the stoker, and with what success, and what saving of fuel they have with it. I would like to ask if it is not a fact that in using the superheater they are going a little ahead of the men not used to taking care of them? It will take a lot more experienced men than we have now running, as I understand they take considerable more care and attention.

PRESIDENT: Mr. T. T. Copeland, Road Foreman of Engines, Carnegie Steel Company.

MR. T. T. COPELAND: Mr. President: The subject is a very important one and deserves more consideration from an economic standpoint than it gets.

Fuel economy is not a one mans job, or left entirely to the Engineer or Fireman, but must have the hearty co-operation from the President down to the man that puts the fuel into the tender. In my opinion it must be admitted by all that a fuel deparment fully warrants the expense incurred. The fuel supervisor should have charge of the buying, he should have charge of the inspection and distribution to the coal docks, also give instructions to division supervisor. Their should be a General Supervisor reporting to the General Superintendent of Motive Power, this supervisor to have charge of the preparing of specifications both physical and chemical, under which all fuel must be purchased. He should have corps of mine inspectors whose duties should be to know that fuel is being furnished according to specifications.

Now that we have the right kind of fuel, the engines should be properly draughted to get the proper combustion. Now comes the education of the engineers and firemen to perform their duties economically, this should be supervised by the Road Foreman of Engines or traveling Fireman and they should be under the Superintendent of Motive Power of their respective division.

Instructions should be given to men in charge of operating locomotives as to the best method in handling and firing.

Then meetings of supervisors and men operating locomotives should be held from time to time for general discussion, giving the men an opportunity to state what success they have had in trying out the different methods that may have been adopted.

There is no doubt that the general agitation of the fuel question will result in fuel economy.

PRESIDENT: Mr. James Spellen, Instructor, B. R. & P. Railway.

MR. JAMES SPELLEN: I am somewhat unprepared tonight to discuss the question of fuel economy in the manner that I feel the question deserves. I have had some experience prior to the past four years, along this line, particularly with locomotive engineers and firemen, and it was about that time that the superheated steam locomotives came to the B. R. & P. and we found that by following pretty closely the instructions which had been given us by the representatives of the superheater Company that we could realize a saving of 20% in coal and 35% in water evaporation. In order to ascertain the facts in the case, as we understood them to be, we made a test of a superheated engine and an engine of the same size and dimensions, saturated, and found that the superheater people had so closely tabulated the fuel consumption and water evaporation, of locomotives to which superheat apparatus had been applied, that we became confident that it would be to our advantage to add this apparatus to other locomotives, and these additions have been applied to several of the older types of engines, and all of the new ones purchased, within the past four years.

I will refer to the tests I have mentioned; briefly, as between the superheated and saturate locomotives, to say, that those tests proved the superheated locomotives were under favorable conditions even giving better results in fuel economy than the superheater representatives had, at the outset, claimed.

As I view the question of fuel economy, it is not all the absolute interest of the engineers and firemen, although it has been put up to them very strongly, this question is sufficiently broad to extend to each and all of the employes, who in any way handle fuel, even from the highest official down to the hostlers and engine preparers at the ash tracks. There are times when it appears that the saving in fuel is not what it should be and it caused us to endeavor to locate the cause, we became strict with the engine crews, we plainly said to them that they had apparently lost interest in the saving of fuel, and when their practices are carefully watched, we cannot find that all of the losses are due to lack of interest and co-operation on their part. Then we found steam leaks elsewhere, and a ring of packing applied to a valve or piston head, or steam leaks at sundry places around the engine, stopped up, very materially assisted in fuel economy. We sometimes thought that we had not begun at the right place in our efforts to economize in fuel, so we learned that the question was big enough and broad enough to include every one who had in any way to do with fuel, to render their assistance with a view to bringing about a more satisfactory result.

The engineer and fireman cannot bring about the required results unless they may have the co-operation of the shop forces, and should the shop forces do their part of the work, reported by the engineer, it is yet evident that there is something lacking, and this we had found to be a lack of supervision, we can place rules and certain regulations in the hands of this class of employes and in addition to this give necessary instruction and then allow them to use their own judgment and exercise their discresion as to how they will effect economy in fuel, but this will not do and it is then necessary to follow up these instructions and rules, by supervision, and in this way, educate the men in the proper way, or the real object will fail of the rightful results.

The more satisfactory results will develop as a higher standard of education among all classes of employes is brought about. The question then that should be given careful consideration by the higher officials, is the education of each employe whose duties require them to, in any way, handle and use fuel, and the kind of instructions best suited to this end should be issued to each department employe, clearly indicating just how and where economy should be made the most effective, and all such instructions should be supervised to the extent of keeping the men so familiar and so interested in this work that the savings in fuel will amply warrant the cost of such supervision. The various other manufacturing industries, aside from railway operations, who have to use coal for the purpose of developing power, are interested in the economy and also the abatement of objectionable black smoke, and to effect the results desired, will learn that proper instructions and education under the supervision of a competent official, will, in due course, redound to their benefit, economically and otherwise, of all operations who have to depend on the use of coal for the production of power.

Again referring to the item of education for engineers and firemen, I wish to quote for the benefit of this meeting an extract from the remarks of a gentleman who has acted in the capacity of an instructor on the Illinois Central Railway, in an address before the Traveling Engineers Association in Chicago, in September, 1915.

"We have a car equipped on this railroad which has two lecturers. They go to the different terminals and spend time there in proportion to the size of the terminal. These men have moving-picture machines and demonstrate with them just what can be done towards economical firing. They also have statistics to show what each division is doing.

"Now I may be a little out of line if I say to you that the Illinois Central last year saved $444,000 in fuel. And we attribute this saving to the men going over the road and talking fuel economy. They not only educate engineers and firemen, but also hold meetings with round-house and coal chute organizations. These statistics I referred to as showing this saving are taken from 1,000 ton miles on freight and 100 passenger car miles in passenger service and hours in switching service."

PRESIDENT: Mr. F. M. Logan, Smoke Observer Pennsylvania R. R.

MR. F. M. LOGAN: Mr. President and Gentlemen: I do not know that I can say very much regarding the road situation in fuel economy, but I might mention a few facts with reference to fuel economy at terminals. In the first place, to economize in fuel at a terminal, proper steps should be taken to instruct the fireman to bring the locomotive in with very little or no green coal in the firebox, as the presence of too much green coal will result in fuel being wasted when the fire is being cleaned. Furthermore, the abatement of smoke is closely related to economy in fuel, in that difficulty is experienced in cleaning a green fire without making black smoke; and when black smoke is omitted from a locomotive stack, it indicates that all the combustible elements contained in the coal are not being consumed in the fire box, but are passing out into the atmosphere. The absence of black smoke at a terminal indicates that the fuel is not being wasted.

The hostlers at the terminal where I am employed have been carefully trained in the methods of effecting economy in the use of fuel and in the abatement of smoke. They have instructions to watch the blower on the locomotive very closely and ease it off when conditions will permit.

PRESIDENT: Mr. J. W. Henderson, Chief of the Bureau of Smoke Regulation, City of Pittsburgh.

MR. J. W. HENDERSON: If you start something about smoke elimination you will hear something about fuel economies.

And after all, the subject of fuel economy commences with the proper combustion of the fuel. All these other things are matters that come after that in the proper use of the heat developed. I refer to these other devices that have been mentioned tonight; superheater, brick arch, proper packing, valves, etc.

I have heard something about strangled intelligence. Here is a case that is outside of our jurisdiction. The information came to us that a minor official in a certain large corporation had, from the men in the engineering department, information that would lead to fuel economy. It would change their equipment also in a way that would cause their stacks to comply with any city ordinance. On account of jealousy, pride of intelligence which shows up as jealousy, this information was pigeonholed. Having a broad interest in smoke elimination, knowing that the broader it is and the farther it reaches, the more it will affect the local interests here, I took upon myself to write a letter of inquiry to one of the highest officials I could reach, asking him, as though I were ignorant, what results they had obtained, or what researches they had carried on, and how far they had gone in smoke elimination and economical combustion of coal—with the idea of drawing this out of the pigeon hole. It came out. I learned afterwards that the men in the enginereing department were wondering what had struck the place.

The great headway we have had in this movement in the past year and a half is undoubtedly due to the fact that we have approached this subject with the idea that it is an economy proposition, that if we would awaken the intelligence that is centered upon the combustion of fuel, we would get the results that the city wants and we would get it from the inside, through the men who are operating fuel consuming devices, rather than by force or by the police power. And we do know that we have had better results through co-operation than has been experienced in any other city in the same space of time or in this city ever before.

I am not a railroad man, but I have learned quite a lot about railroad men within the last two years and also considerable about locomotive operation. And we have a great deal to be proud of in the city of Pittsburgh in the way of co-operation on the part of the railroad officials that has been given the city in its efforts to clean the atmosphere. This work has also extended outside the city limits into the neighboring districts. I could name two plants that have installed stokers under, not only guarantees as to fuel economy, labor, repairs, etc., but also that the stacks will at all times comply with the Pittsburgh smoke ordinance adopted in 1914.

Talk about economy! Not far from me at this moment is a gentleman who at our last meeting stated that by the installation of a stoker, in a small power plant in this city, it saved 30% of the fuel. Here is another case. They have 24 boilers and 6 stacks and were up against the proposition of an increase in capacity of 50%. When they changed the stokers to a more modern type they obtained the same power they had been getting and cut out 6 boilers. So as I stated at the beginning the proper place to talk about this fuel economy, and it is real national preparedness, is to commence at its combustion and all these other devices are simply adjuncts to the proper use of the heat developed.

PRESIDENT: May we hear from Mr. F. H. Stark, General Superintendent Montour Railroad?

MR. F. H. STARK: I hesitate to attempt to make any remarks, for at our last meeting when our President asked if I had anything to offer I modestly replied that I was hardly qualified but that I would suggest a friend, Mr. Harry Lydick, as a substitute. After Mr. Lydick's very able discourse a member of the Club, whom I considered as a friend, volunteered to state that I displayed very good judgment. You can draw your own conclusions. I regard the paper presented here tonight as one of the greatest literary productions on "Economy of Operation in a Most Practical Manner."

The speaker brought out very forcibly the subject of supervision and the question naturally arises as to whether smaller roads can afford to employ specialists. As a business proposition the expert should at least cause a saving equal to his salary; then too, aside from fuel waste there are numerous other leaks in all departments of railroads. If experts are employed, will other officers relieve themselves of the responsibility, for the speaker has emphasized the necessity of co-operation of all employees?

Mr. Woodbridge might tell us something about powdered fuel and the results obtained.

In regard to the superheater: We have recently received four large Mikado locomotives that are giving excellent service. Our engineers had no prior experience with superheater equipment and yet with a little coaching on the part of our friend, Mr. Buckbee, the engineers have handled the power without any difficulty. We made a trial trip over the P. & L. E. R. R. a short time ago with 102 loaded steel cars, with an aggregate gross tonnage of 6,515 tons, which was a creditable performance.

MR. A. STUCKI: Another point just mentioned in the paper is the retardation of the trains or train resistance. This is a very interesting and important item and especially since we now use all steel cars of high capacity, we know, that the retardation of the train while passing curves is great and instead of grinding up this energy between the wheels and rails, a frictionless side bearing is often used. This is removing the trouble right at the source and goes back beyond the stage, which Mr. Henderson mentioned, "the burning of the coal," and if we can avoid this waste of energy, we are that much ahead in the coal bill.

Besides this item the author may also be good enough to give us some data regarding the admission of heated air above the fuel bed, a principle which is for instance used with the Gaines Arch.

MR. H. G. SCHECK: Road Foreman of Engines, Penna. R. R., Mr. President: I think the paper tonight is the best and shortest that I have ever heard in this Club. It has said so much in so few words. It appears that in fuel economy today the majority of railroad people think it all lies with the engineer and fireman to reduce the consumption of coal to a minimum. To this, I do not agree. The paper treats on lubrication, which is a very essential point, as we are aware a few drops of oil saves many a pound of coal. There is another very essential part of the paper in which it speaks of co-operation. This means to my mind the co-operation of every employee on the road, it does not mean just the engineer and fireman, it means every transportation man that has anything to do with the moving of trains and engines. When you speak about burning the heart out of men, you have touched another very vital spot. You can supervise and have the men educated to do certain things just right and they figure on making a big saving in the coal pile, but when they run up against unnecessary stops and other conditions along the road of which they have no control, they do say, "What's the use." We think that engines equipped with the brick arch or superheater is one of the greatest improvements we have ever had on a locomotive in the way of saving coal and water and making the engine more efficient, but we msut not lose sight of the fact that these improvements have got to be kept in the best of condition by the shop people.

MR. H. B. KELLEY: Assistant Road Foreman, P. & L. E. R. R. I would like to ask the speaker in case where a saturated steam engine has been converted to superheat steam whether, in his experience, he has found it necessary to reduce the size of the nozzle in order to make the engine steam as free when equipped with superheat as she did before being equipped with superheat, and if he considers it necessary to run the same size nozzle with the superheat steam as with saturated steam in reference to back pressure?

MR. A. G. MITCHELL: Superintendent Penna. R. R. Some years ago, before the superheater came into general use, we had a speaker who was in the government service talking before this Club on fuel economy and who made the statement that if he was going to design an engine he would first want to know the coal that was going to be burned in it as he would make a different design of engine to be used with one kind of coal from that he would design for another kind of coal. We all know that in Western Pennsylvania, especially in the soft coal region, we have different grades of coal furnished as fuel for locomotives. I would like to have the speaker touch on the question of whether the grade of the coal is of vital importance with the improved locomotives of today.

MR. TURNER: I appreciate fully that Mr. Woodbridge has been asked quite a number of questions to be answered in closing the discussion, but as so many valuable thoughts have been expressed in the way of economical operation of locomotives, I shall ask the privilege of making a few more inquiries, which I hope Mr. Woodbridge will find time to answer in closing the discussion.

He has spoken of the care to be exercised, first in the employment of locomotive firemen, and second, in the training of the fireman. It should be remembered that a great deal of the successful movement of a train depends upon the fireman, and in order that we may all benefit in our daily work, I want to ask Mr. Woodbridge what methods are pursued in the employment of a man for the position of fireman, and how it is determined as to whether or not a man possesses the proper qualifications, also after he has been given employment, what methods are pursued so that it is known that he performs his work in the manner that will produce the very best results. Third, what is considered as the most important question of all-what methods are pursued to know that the fireman follows his instructions when he is out of sight of his instructor.

It is well understood by Road Foremen of Engines and others who come in close contact with locomotive operation, that the same conditions prevail in this class of work as in any other class. Some men are employed who take to the work naturally. They love their work, and make every effort voluntarily, to get their engine over the division with the smallest consumption of fuel. Then we have others who, while they might be well disposed, any instruction as to combustion, the proper handling of the fire, or the necessity of shaking the grates, loosening up the clinkers, etc. falls upon deaf ears, and while they would be a decided success in some other lines of work, they are failures as locomotive firemen. Then again, we have the man who is entirely indifferent as to whether he burns three tons of coal or five tons. The additional coal that he may have to handle in order to permit him to ride upon the seat box longer, produces no cares for him. His whole ambition in life is to get through the world as easily as possible, without making any effort for the betterment of his condition, or enhancing the interests of his employer, and anything that Mr. Woodbridge can say along these lines, I am sure will be helpful to us all.

PRESIDENT: Is there any further discussion? If not I will ask Mr. Woodbridge to close the discussion.

MR. WOODBRIDGE: I thought I was going to get off easily but I see that my hardest job is ahead of me, however I will try to answer these questions as best I can. As regards super-heating, there are no doubt a great many men here who can discount me on that subject. I think Mr. Spellen answered Mr. Turner's first question, but I would like to corroborate his remarks. I was very much interested in some tests made with a consolidation engine of about 40,000 pounds tractive effort using saturated steam and an engine of the same dimensions which we had converted into a super-heater. In several test runs the coal and water were carefully measured and we found that the super-heater engine, doing the same work, consumed 25% less fuel than the saturated engine, between terminals. Right here I want to say that while such economy in fuel may be depended upon while engines are in actual service the consumption of coal at terminals is so great on all engines, that application of super-heating apparatus will not reduce the total fuel consumption 25%.

We conducted some experiments to determine the amount of fuel burned in keeping a locomotive alive at a terminal and we found that it took 3.3 pounds of coal per minute to just keep the steam pressure within five pounds of the maximum. During the next test we crowded the fire just enough to keep the muffled pop valve open moderately and found that for this 8.8 pounds of coal per minute were required. Then we forced the fires so that two pop valves were kept open and this required 31.1 pounds of coal per minute. During these tests steam for the blower was supplied by another engine. So you can figure a loss of approximately 15 pounds per minute on the average when the pops are blowing. I thought that this might be interesting as corroborating the statement we hear so often about the fuel losses, account delays and open pops. I want to shake hands with the men who said that fuel economy depends on a lot of other people beside the firemen, engineers and shop men. The train dispatchers, yard masters, station agent and train crews are responsible for many delays and you can depend upon it that from three to fifteen pounds of coal is wasted per minute per engine delayed on the road or while ready for service.

The value of increased efficiency of the locomotive due to superheat is very great; in heavy and fast passenger service it has largely eliminated double heading and in freight service the more rapid movement has aided wonderfully in avoiding car shortage, and in the satisfactory handling of business. I cannot estimate the value of superheat in these far-reaching generalties. As Mr. Turner indicates, we must not economize in fuel if that involves a reduction in tonnage or slower movement of business.

I am sorry that there are not some stoker men here and I regret that we cannot claim the economy of fuel with the stoker in locomotive service that it effects in stationary practice. The problems are entirely different, however, we can claim a very great advantage especially with the large engines, in another direction for you can work an engine unmercifully if it is equipped with a stoker, and you can use a grade of coal which is very inferior to the fuel which is required for hand firing. We have only a few stokers, 5 on mallett engines and 1 on a mikado, with the mikado we went so far as to mix, half and half, slack coal and crushed "bony" as the miners call it. We made several successful tests of this over a very hard division with the engine supplied with a mixture, 50-50 of pure slack and this crushed stone. So there are great possibilities in that connection and in the movement of trains with the assistance of the stoker and with the stoker which Mr. Crawford has developed black smoke is practically eliminated. I had some very pleasant and profitable trips on Pennsylvania engines a year or so ago which were equipped with that stoker.

I want to say, if Mr. Buckbee will excuse me, a word or two about the care of super-heaters. We have not found, in four years with the super-heaters, that our enginemen needed a tremendous amount of instruction, they needed some, of course, but we have had practically no trouble due to errors on the part of enginemen. We have had a little, due possibly to the fact that the engines were not equipped with proper drifting valves, some of our men became careless about shutting off after the cylinders and steam chests had gotten very hot at the top of a long grade, the lack of steam at such times permitting carbonization in the chests and cylinders. Some roads have had trouble with units leaking due to the water in boiler being carried too high and then someone opening the throttle valve quickly permitting a rush of water into the units which simply knocked the return bends off. You do not want high water with a superheater, the water should be carried at the same level as with a saturated steam engine, possibly a little bit lower because the engine will go farther with the same amount of water, but you can carry it up in the stack. I rode for nine miles with a man who could not blow the engine's whistle for a single crossing because he had water in the whistle all the time and he went along alright, he thought he had something up his sleeve but was simply fooling himself. I never found any of our men who attempted that sort of thing. As I said, I do not know how you can figure the total value of the super-heater in the movement of trains, you know the engine is smarter but I cannot calculate what that value is, everything considered.

I want to say something to the shop men on the super-heater. It must be properly installed. One of our neighboring roads had no trouble at all with super-heater units for three years after the engines came from the locomotive works but within three months after they had gone through the shops the units were leaking all the time and one of the super-heater company's experts found that the trouble was due principally to failure to properly space the binding elements. You cannot hold a super-heater unit tight on the header if you let the back end wobble up and down with all the supports in the middle or near the front end, and you cannot hold it tight if the supports are at the extremes and nothing in the middle.

About powdered fuel, I have had several talks with men who knew something about it. I know very little. I have some figures in my desk on the cost of installation of grinding, drying and storage plants for powdered fuel. I am afraid it will require a very large expenditure to equip even one division with proper apparatus at terminals to prepare and handle powdered fuel, to say nothing of the cost of preparing the locomotives, but it is worth considering just the same and in this connection I want to say that Mr. Muhlfield who heads a company which is to exploit powdered coal apparatus, is to read a paper before the New York Railway Club next month on that subject and I would recommend that you get the proceedings of that meeting.

The Gaines arch certainly looks good. I had a short ride recently on a big 2-10-2 type of engine with the Gaines arch in combination with the old-fashioned arch and the engine worked splendidly. The idea of introducing warm air over the fire and under the arch is certainly a move in the right direction, the hotter the air that enters the furnace before it combines with the gases the better combustion you certainly will have.

Mr. Stucki is of course to be excused for referring to antifriction side bearings. I certainly do not know why he asked me to say anything about that, because he can tell you to the fraction of an ounce how much coal such features will save. I am in favor of such means for eliminating retardation to the movement of trains as well as decreasing flange and rail wear and derailments.

Mr. Kelley asked about the comparative size of nozzle tips in saturated and super-heated engines. We have converted twenty-five or thirty engines and in some instances these engines ran for a considerable period with the same nozzle that they used with saturated steam. But generally speaking I think that a smaller tip is a little more satisfactory with super-heaters and not at all detrimental to the performance of the engine. The lighter gas seems to get out easily enough. I think it is a matter of trial and depends very much on what size tip you have been using with saturated steam.

Mr. Mitchell asked as to the necessity for change in design of a locomotive for various kinds of coal. I happen to be connected with a railroad which has about fifty coal tipples along its lines where the Coal Company mines coal and I guess that we get a little from each one of the fifty every month for our locomotives. I have often tried to get coal from one or two or even six regularly, but I have not been able to do it yet. I railroaded out in Minnesota and in Iowa for six years and we got what we called Iowa rock, out there, which was mighty nice stone to handle as we never had to use the rake but there was lots of dirt and clinkers in it. We occasionally got Pennsylvania and West Virginia coal by way of Duluth, but I have never heard of making any material change in the design of an engine for the various kinds and grades of bituminous coal except of course the change in the grates which is at times advisable and in re-adjustment of the draft regulating apparatus. For hard coal or lignite some changes in design are desirable.

Mr. Turner asked me a very hard question about the best method of selecting, training and supervising firemen. If business could be kept somewhere near a given volume instead of fluctuating so greatly, the selection of men would be simplified. The new men who are good and capable of getting positions most anywhere leave the service when business slumps and the poor men who can't get jobs anywhere else hang around and they are the first men you can get your hand on, when business picks up with a rush. I don't know how you can improve this situation, I wish I did. Proper and adequate supervision will quickly improve or weed out the most undesirable material. Progressive examinations will do something along that line and when a new man is started out there is a lot of good that can be done very quickly. If you start him out as we have done, and as a good many roads do, by simply giving him a letter and telling him to keep going until he gets three engineers to O. K. him as a fireman, unfortunately he will get with the least desirable crews very frequently and he will acquire some training which will not help him any, later. If you can select the men with which the beginner makes his first trial trip and by whom he is O. K.'d for service you will go a long ways towards starting him right. As for supervision after he is in the game, the road foreman and his assistants as well as any instruction department which you may see fit to provide, have much to do. I do not like to go into details on that but will say that you can load a Road Foreman down, until he is little more than a trainmaster's assistant or superintendent's assistant in the office.

If you make a road foreman attend every "court meeting" if you hold what we call courts, or every investigation of a derailment and keep him away from the men he is supposed to supervise, about 90% of the time, and then give him 100 engines to look after, you might just as well discharge the clerk and keep him in the office all the time. There is a lot of bookkeeping and investigating that ought to be settled by one man for all departments without a lot of red tape, and the road foreman and his assistants must have opportunity to do the work in which they can best make money for the company rather than in fixing up an accident after it happens. If you let them loose a little they will prevent a lot of that stuff and you will not have so many investigations to make.

I fully intended not to say anything about any of my hobbies but you have forced me into it so you must assume the responsibility. When you design or adjust the front end draft regulating apparatus; generally, you design or adjust it so as to make the engine steam when that engine is run by escond rate engineer, fired by an inexperienced man under unfavorable conditions with any kind of fuel he can get. You also make adjustments so that the engine will steam in running cut-off with a good throttle, going rapidly. Under those conditions the nozzle tip is too small and other draft arrangements wrong for good coal with a good engine crew under favorable conditions and also when the lever is down in the corner and when the engine is making a flying switch or doing something of that sort. And when the engine is drifting there is considerable draft on the fire and it would take a clever man to construct ashpan dampers that would be tight on our ashpans. So three or four years ago I designed a front end damper. We have it on about 200 engines and think it is alright. This damper closes downwards on the deflector plate and its opposite side closes upwards on a plate across the smoke box close to the front door. There are short filling pieces on either side of the smoke box. When the damper is shut it makes a solid and as nearly tight as you can get it obstruction to draft through the flues. When our men get a tank of slack they will frequently almost close the damper when starting to avoid holes being torn in the fire by the heavy exhausts. If the engine is steaming well the fireman will regulate the draft on the fire to suit himself. Going into a junction point where switching is to be done he will have a good fire in the engine and shut the damper up tight. The draft will jerk it open a little bit when engine exhausts. With damper shut and a good fire, you can switch for an hour and not add a bit of coal to the fire, what little steam pressure the engine loses in a short movement, will be gained while the engine is not using steam and the engineer cannot tear holes in the fire. While running, the good fireman has a chance to cut down the draft that the man who "bales it in" needs. In our tests we found that during a drift of 17 miles the damper will save at least 500 pounds of coal.

One of my later hobbies is a lubricating scheme, to go into that thoroughly would take me all night. We have 85 slide valve engines which were built within six or seven years and which have cylinders that we cannot afford to throw away. They are just beginning to need new flue sheets and for some time the problem of lubricating a slide valve using super-heated steam has been of interest to us. We accomplish this by introducing under the valve a jet of saturated steam and oil, in other words we bathe the bottom of the valve with saturated steam and oil this is done very nicely with no complications. I'll be very glad to send any one who is interested, our blue prints showing the application. We have a large Atlantic type engine, so equipped, which will run into Pittsburgh very shortly and you can then see how it operates. The consolidation engine which we equipped last June, has now run about 30,000 miles and we think that we have solved the problem so far as our railroad is concerned. On this engine, I have had the throttle as far out as I could pull it for more than 50 minutes and then unlatched the reverse lever and held it with one hand, on other occasions, after a slow run of more than 50 minutes with full throttle, I have put the lever into the corner and hooked it up onto the center three or four times while running 35 miles per hour with a full throttle. If I had done that, and those valves had not been properly lubricated, you all know that the lever would have put me through the front window very promptly. I presume that some of you are thinking about the warping of a slide valve. Well, I figured this way—if you heat a cast iron valve up to 387 degrees, the temperature of saturated steam at 200 pounds pressure and it does not cause any trouble by warping, the additional warping due to an addition of 200 degrees temperature would not be enough to cause a particle of trouble and this theory is supported by our experience so far. By the way, we have operated this engine on the same allowance of oil which we give a piston valve super-heater of the same size. I do not think that is quite enough but the engine is operated on this amount without any material trouble. I have already taken up too much of your time. I thank you.

MR. H. H. MAXFIELD: I do not think it necessary to add anything to the complimentary remarks that have been made in reference to this paper, but in order to emphasize our appreciation of this paper and its value to the Club, and also to make it a matter of record, I move that the Club tender to Mr. Woodbridge a rising vote of thanks.

The motion prevailed by unanimous vote.

ON MOTION, Adjourned at 10:17 P. M.

J. B. Anderson
Secretary.

In Memoriam

J. J. TOOMEY

DIED DECEMBER 28, 1915

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of January, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.
SUBJECT—"Modern Brake Apparatus" by S. W. Dudley.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.
SUBJECT—"Physical Valuation of Railroads" by F. C. Shephard.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.
SUBJECT—"Car Construction" by K. F. Nystrom.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.
SUBJECT—"Transportation in Alaska" by W. R. Crane.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.
SUBJECT—"Useful Personality" by V. L. Price.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.
SUBJECT—(not obtained)

Ceneral Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.
SUBJECT—"Yard Operation" by J. R. Hamilton.
"Modern Roundhouse Methods and Facilities" by J. H. DeSalis.

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.
SUBJECT—"Fuel Economy" by H. C. Woodbridge.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

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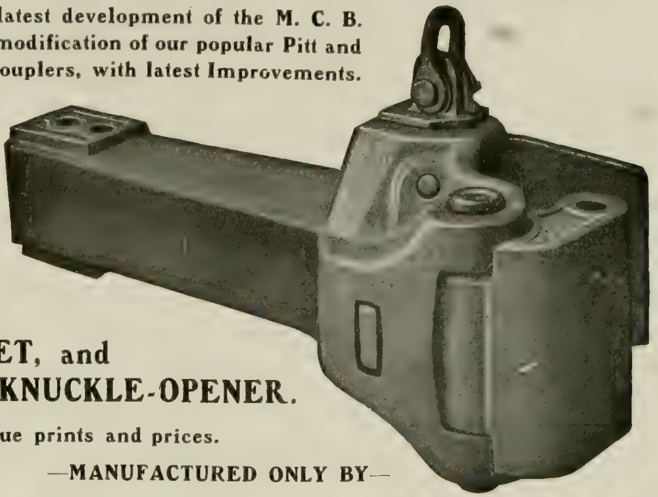

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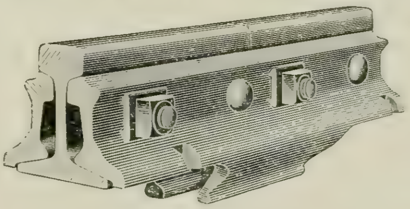

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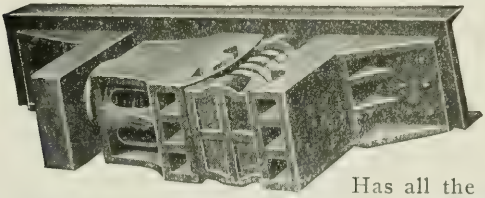

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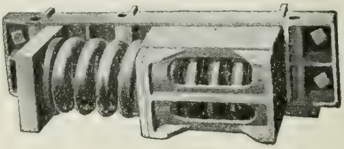

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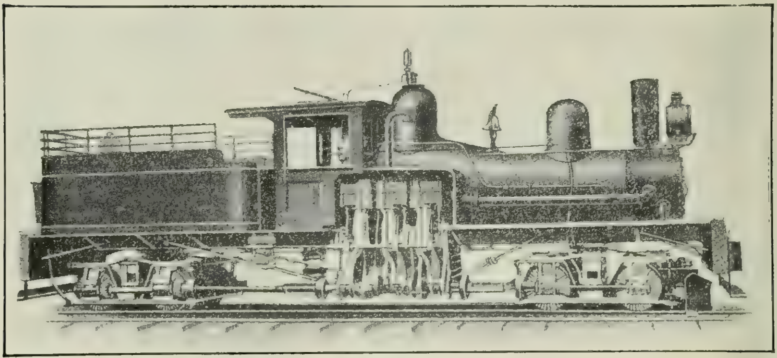

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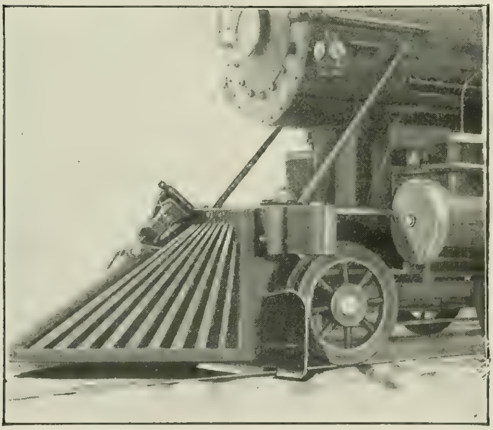

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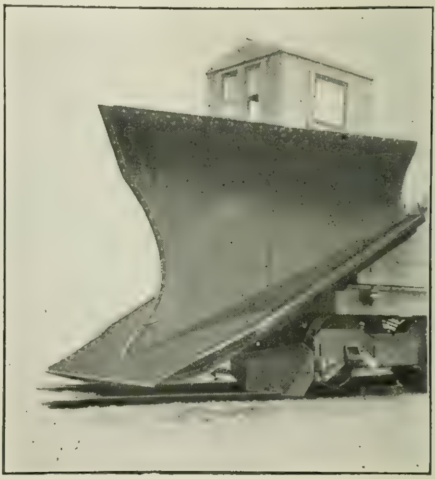

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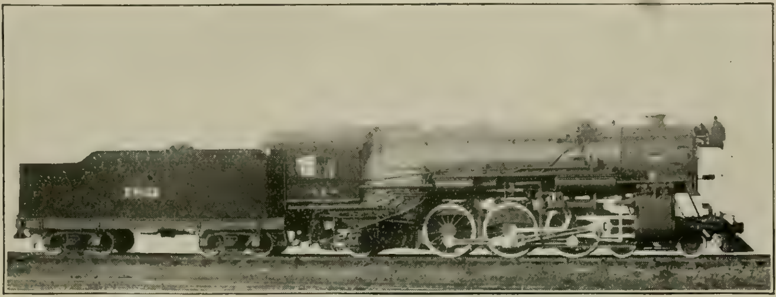

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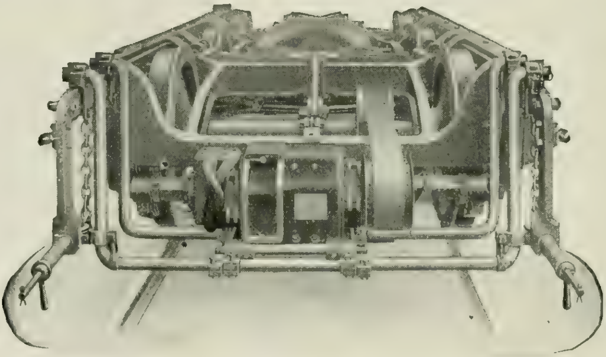

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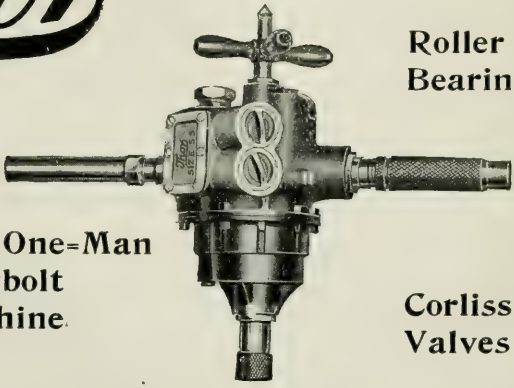

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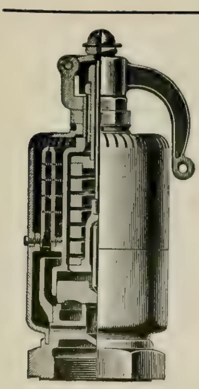

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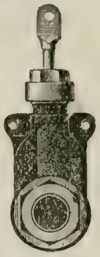

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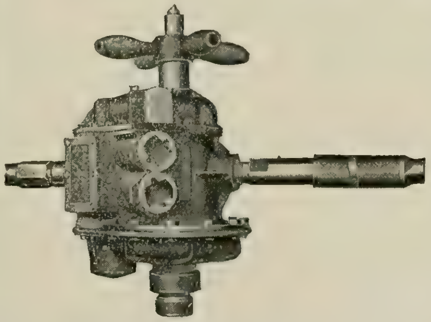

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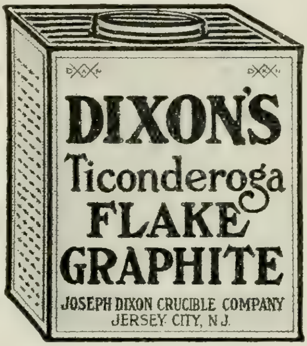

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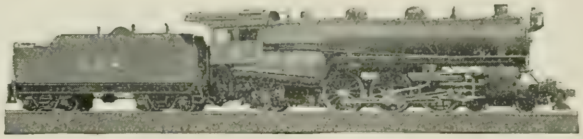

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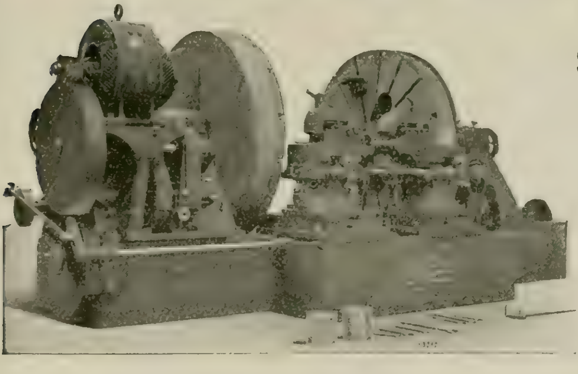

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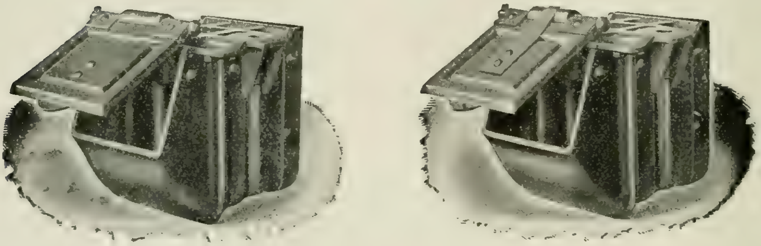

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D. J. REDDING	November, 1908, to October, 1910.
F. R. McFEATTERS	November, 1910, to October, 1912.
A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING, FEBRUARY 25, 1916.

The meeting was called to order at the Monongahela House, Pittsburgh, at 8 o'clock, P. M., with President F. M. McNulty in the chair.

The following gentlemen registered:

MEMBERS.

Adams, Lewis
Alleman, C. W.
Allison, John
Amsbary, D. H.
Anderson, A. E.
Anderson, J. B.
Barth, John W.
Battinhouse, J.
Bell, R. P.
Berghane, A. L.
Bosley, N. D.
Boyd, David H.
Boyer, Chas. E.
Braun, Otto
Burket, C. W.
Calvin, Albert W.
Carroll, F. E.
Cassidy, C. R.
Chapman, B. D.
Chester, C. J.
Clark, C. C.
Clark, W. M.
Cline, W. A.
Code, J. G.
Conway, J. D.
Cooper, F. E.
Courson, J. F.
Courtney, D. C.
Crawford, D. F.
Dambach, C. O.
DeArment, J. H.
Dickinson, F. W.
Eckstein, J. E.
Emery, E.
Farquhar, L. C.
Fields, A. C.
Fitzgerald, D. W.
Fogle, Emmett
Forcier, C. W.
Freshwater, F. H.
Fulton, A. M.
Gale, C. H.
Geary, John J.
Graham, R.
Grewe, H. F.
Gross, C. H.
Hammond, H. S.
Hankele, Edwin W.
Harsch, A. M.
Haynes, J. E.
Hindman, S. M.
Hoffstot, Henry P.
Holt, James
Howe, J.
Hudson, W. L.
James, Robert E.
Johnson, I. S.
Kelly, Harry S.
Kelly, H. B.
Kelly, L. J.
Kinch, L. E.
Kleine, R. L.
Knox, Wm. J.
Koch, Felix
Koch, H. J.
Kummer, Jos. H.
Lanahan, Frank J.
Lanahan, J. S.
Lansberry, W. B.
Laughlin, James
Lawley, R. N.
Long, R. M.
Laylin, M. H.
Lidstone, Fred. J.
Lobez, P. L.
Loughridge, H. W.

Low, J. R.
Llewelyn, W. R.
Lynn, Samuel
Marcus, M.
Marshall, W. T.
Maxfield, H. H.
Mitchell, A. G.
Murphy, Paul F.
McCann, J. P.
McCollum, George C.
McDonnell, F. V.
McKee, D. W.
McNulty, F. M.
Neel, Tom
O'Connor, M.
Page, A., Jr.
Painter, Joseph
Pfeil, John
Rambo, R. E.
Redding, D. J.
Richardson, L.
Richardson, W. P.
Ritts, W. H.
Robbins, F. S.
Roemer, M.
Root, R. R.
Rupprecht, K. J.
Sanderson, W. W.
Schomberg, W. T.
Schaich, Wm. L.
Schuchman, W. R.
Shaffer, George C.
Shoureck, T. L.
Slutzker, Joseph
Smith, J. H.
Smoot, W. D.
Sturmer, George W.
Stucki, A.
Suckfield, G. A.
Snyder, C. H.
Swann, J. B.
Thomas, E.
Thurlby, A. R.
Townsend, J. F.
Turner, L. H.
Van Dalsen, G. A.
Wagoner, Henry
Wagner, E. A.
Warne, J. C.
Watkins, G. H.
Way, E. S.
Weiss, C.
Wharton, J. E.
Wilder, Henry W.
Williams, A. G.
Williamson, J. A.
Wolfe, L. L.
Wyke, J. W.

VISITORS.

Africa, J. H.
Allen, Harvey
Anderson, L. C.
Atwater, H. R.
Bancroft, A. G.
Bigler, Roy E.
Booker, George
Brunswick, A.
Calvin, Glenn G.
Chillcott, Wm.
Code, Chas. J.
Crane, E. S.
Crosier, C. H.
Douglass, Wood
Felton, F. J.
Geisler, J. J.
Guyler, E. J.
Hahasey, Thos.
Howett, W. E.
Jackson, W. E.
Johnson, Chas.
Kapteyn, Albert
Kinch, D. L.
Kranser, W. G.
Lehman, A. C.
Moore, Frank
Myers, C. E.
McAdams, T. J.
McCurdy, R. M.
McMonigle, E. E.
Oakes, A. S.
Pinder, J. F.

Penz, Otto F.
Reynolds, D. E.
Riley, T. M.
Roberts, W. P.
Rogers, John
Ross, C. W. C.
Rummel, C. C.
Ryan, D. W.
Sallic, Tom
Schuchman, B. F.
Shaffer, F. G.
Smith, P. F.
Stanley, W. C.
Stenson, G. A.
Thoms, F. B.
Thomas, J. F.
Thorn, Harry
Tibbals, S. B.
Wible, E. F.
Wiles, R. D.
Williams, C. F.

The reading of the minutes was dispensed with, the Proceedings being already in the mails.

The Secretary read the following applications for membership:

Bikle, Paul F., Signal Foreman, Pennsylvania R. R., 912 West Street, Wilkinsburg, Pa. Recommended by Louis E. Endsley.

Brandt, W. L., Machinist, Pennsylvania R. R., 436 Southern Avenue, Knoxville, Pittsburgh, Pa. Recommended by C. F. Adams.

Burley, J. B., Representative, The James Lappan Manufacturing Co., 20th and Pike Streets, Pittsburgh, Pa. Recommended by F. S. Robbins.

DeRemer, C. A., Engineer, B. & O. R. R., 621 Walker Avenue, Butler, Pa. Recommended by D. C. Courtney.

Johnson, Wm. M., Jr., Sales Manager, Greenville Steel Car Co., 25 Penn Street, Greenville, Pa. Recommended by C. O. Dambach.

Lopp, Chauncey B., Engineman, Pennsylvania R. R., 525 Chalfont Street, Pittsburgh, Pa. Recommended by R. E. Lopp.

Trautwein, G. E., Civil Engineer, Pennsylvania R. R., 7036 Fletcher Street, Pittsburgh, Pa. Recommended by T. H. Gray.

PRESIDENT: When these applications have received the approval of the Executive Committee the applicants will, upon payment of dues, become members without further action.

Under the head of new business Mr. J. G. Code offered the following resolution:

MR. J. G. CODE: Mr. President—"Faith, hope and charity, and the greatest of these is charity." I do not wish to make any appeal for the starving Belgians or anything of that kind, but I do wish to call your attention to what is the broadest and greatest exhibition of charity, that is love for your fellow-man that leads to kindly, thoughtful actions in every day life, the thoughtfulness for the feelings of your fellow-man, for his welfare and pleasure which is manifested in so many ways and which might be manifested in so many more ways by all of us in our every day relations.

And in that connection I wish to call attention to the pleasure which has been afforded the members of this Club today at the hands of one of our members in being entertained and having afforded us the opportunity to see one of the large industrial enterprises of the Pittsburgh District which must add to our pride in our own city. And I suggest that a vote of thanks be extended to Mr. Lanahan for his thoughtful act of kindness to us all.

The motion prevailed by unanimous rising vote.

MR. FRANK J. LANAHAN: I thank you gentlemen for the vote of appreciation. We were very glad to have the members of The Railway Club inspect our plant today and see the process of manufacturing malleable iron castings. I hope sometime in the future that either singly or collectively you will come again to see us, and be assured a cordial welcome will always await you.

Mr. L. H. Turner extended a cordial invitation from The Traffic Club of Pittsburgh to the members of this Club to join the Traffic Club, which is now broadening its membership and making plans for Club Rooms. President Townsend, of the Traffic Club, who is also a member of The Railway Club of Pittsburgh, was introduced and most warmly enforced the invitation extended through Mr. Turner.

There being no further business, the President introduced the speaker of the evening, Professor Enrique Touceda, who presented a paper on "Malleable Iron—Its Use and Abuse", illustrated by lantern slides.

MALLEABLE IRON — ITS USE AND ABUSE.

By Prof. Enrique Touceda.

As a material of construction and as a component part of machines, the malleable iron casting has covered a wide field of usefulness, particularly during the past forty years. The industry has had a rapid growth, and at the present time there are some 130 different foundries in this country, with an aggregate capacity of close to a million tons per annum.

It is not my purpose, however, to enter into historical details as to discovery, growth, etc., except very superficially; but rather to confine my remarks mainly to only such information and discussion as I have reason to believe will prove to be of practical value and interest to you as engineers. Mindful of the fact that in these busy days it is only in rare cases that the engineer has had the opportunity or time to familiarize himself with the details of the process of manufacture of these castings, coupled with the fact that it is necessary to be somewhat acquainted with them before certain facts that I desire to make clear can be explained, we will first take up in a very brief manner the process itself, though with the restrictions that have been placed upon me by your Secretary to be as non-technical as possible. Before, however, we can take up this matter intelligently, it is first necessary to understand in what manner an iron that is white in fracture differs from one whose fracture is gray.

Research has shown that if carbon be introduced into a bath of pure iron it will dissolve, and after solidification has taken place it will be found that in accordance with an inflexible law, the carbon has combined chemically with a definite portion of the iron. This chemically combined carbon and iron is popularly called "carbide-of-iron", a constituent, which while made up of comparatively soft iron and very soft carbon, differs from both in that it is of extreme hardness and brittleness, and harder even than any constituent found in hardened steel. White iron contains this compound in large proportion, which serves to explain why such iron is so hard and brittle and so white in fracture. The foregoing holds true in all cases where carbon is introduced into a bath of pure iron, and also where the bath of iron may contain a limited amount of impurities, some of which actually favor the chemical union of the carbon and iron; some being inert to this action, and some tending to inhibit it if present in sufficient quantity.

A reasonable amount of phorphorus for example is inert to this action, sulphur and manganese favor it, while if silicon is present in excess of a certain quantity it prevents the union of the carbon with the iron and forces the carbon to separate out as graphitic flakes of irregular size, distributed more or less uniformly throughout the mass of metal.

When there is sufficient silicon in the bath to cause this to happen, the fracture of the metal is invariably gray. In short, when we see an iron white in fracture, we can at least be sure of the fact that silicon is present in comparatively small amount and that the carbon present does not exist as such in the iron, but has combined with a definite part of the iron to form the hard and brittle constituent called carbide-of-iron; while if the fracture is gray, we then know that most, if not all, of the carbon exists in an uncombined state, in the form of flakes as previously described, and that the silicon must have been high enough to have prevented the chemical union of the carbon with the iron.

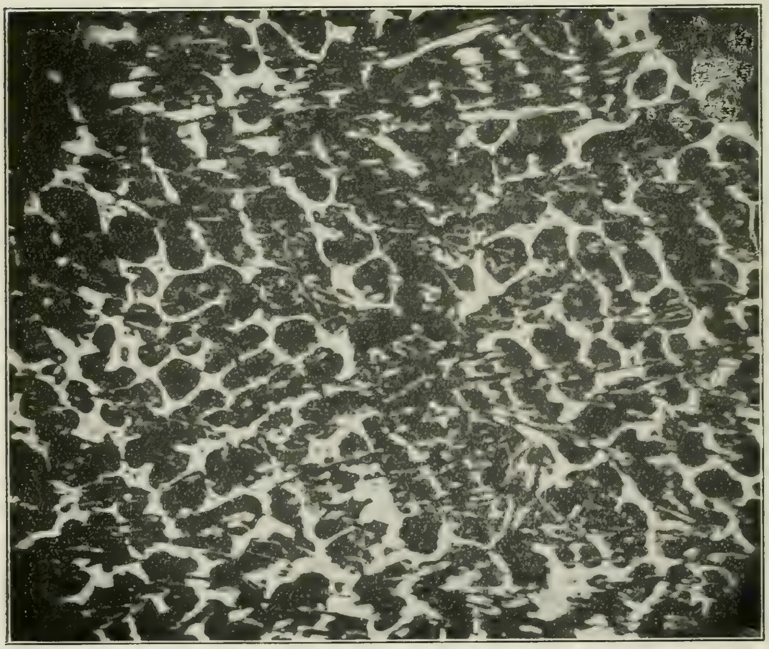
Those of you who can hark back to the time when you first studied metallurgy, will recall the fact that in the early days, the first iron that was successfully run from the tap hole of a blast furnace; the first pig-iron ever made and for many years afterwards the only kind made, was described as being white in fracture, as brittle as glass and extremely hard, much to the disappointment of the furnaceman whose dream it was to pour this iron into molds, and thus make castings which would serve to lessen the arduous labor of the smiths, who prior to this and for some time afterwards had to fashion all shapes from blooms by the sole aid of muscle and forge-fire.

This pig-iron was white, because in those days hot blast was unknown, and the blast outfit a toy as compared with present day equipment, the result being that they were restricted to furnace temperatures far under what was necessary to produce a silicon content in the pig high enough to prevent the carbon from combining chemically with the iron

Gray iron had never been made, and the furnacemen knew nothing of its characteristics or possibilities, or even that it could be produced by increased furnace temperatures. The discovery was fortuitous and the knowledge came by degrees as improvement in furnace, equipment, and fuel took place during the natural progress of events as the years rolled on.

During the interval referred to, the attempt to make serviceable castings from this hard and brittle iron was at the start probably abandoned, until it possibly occurred to some one to see if this brittleness and hardness could not be moderated in some manner, and a greater strength obtained through a prolonged heating of the castings. This was found to be beneficial, and while the treatment was very incomplete as compared with present day practice, it really marks the beginning of the effort to convert white iron castings into ones that are strong, tough and ductile.

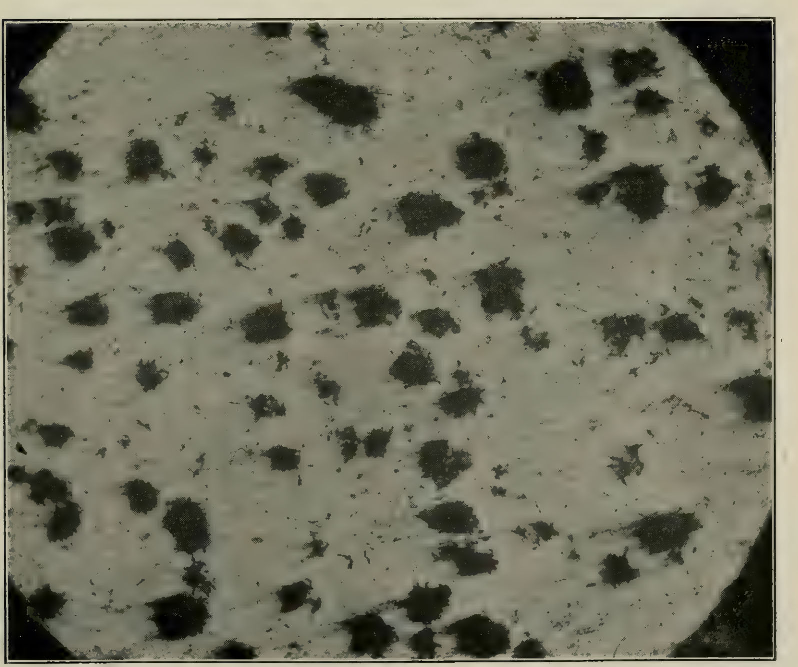
The question of paramount interest to you now is why a prolonged heating, at a certain temperature for a certain interval of time will change an extremely hard and brittle casting into one that is both soft and strong and whose fracture will be black. This we will undertake to explain in part by aid of Micrograph No. 1., in which is shown the typical structure of white iron.



Photograph 1.

The white areas are the hard and brittle constituent carbide-of-iron, called by the metallographist "cementite"; the dark is a mechanical mixture of this same constituent and of iron free from carbon, in the proportion of 12% of the former to 88% of the latter, called by the metallographist "Pearlite", so actually the structure consists of but two elemental substances, the hard carbide-of-iron, and soft iron free from any carbon whatever.

We have seen under what conditions soft iron and very soft carbon can unite together to form a chemical compound as hard as quartz, but fortunately it has been found that this compound is not stable when exposed to a high temperature, and if it be heated long enough at such temperature it will split up into its two original soft constituents, which when chemically united caused it to be so hard, with the result that we obtain due to this treatment a structure consisting of a ground mass of very soft and ductile iron throughout which is uniformly distributed small nodules of free carbon, as can be plainly seen by reference to Micrograph No. 2. By comparing Micrograph No. 1, with No.



Photograph 2.

2 the profound change that takes place through heat treatment will be immediately seen.

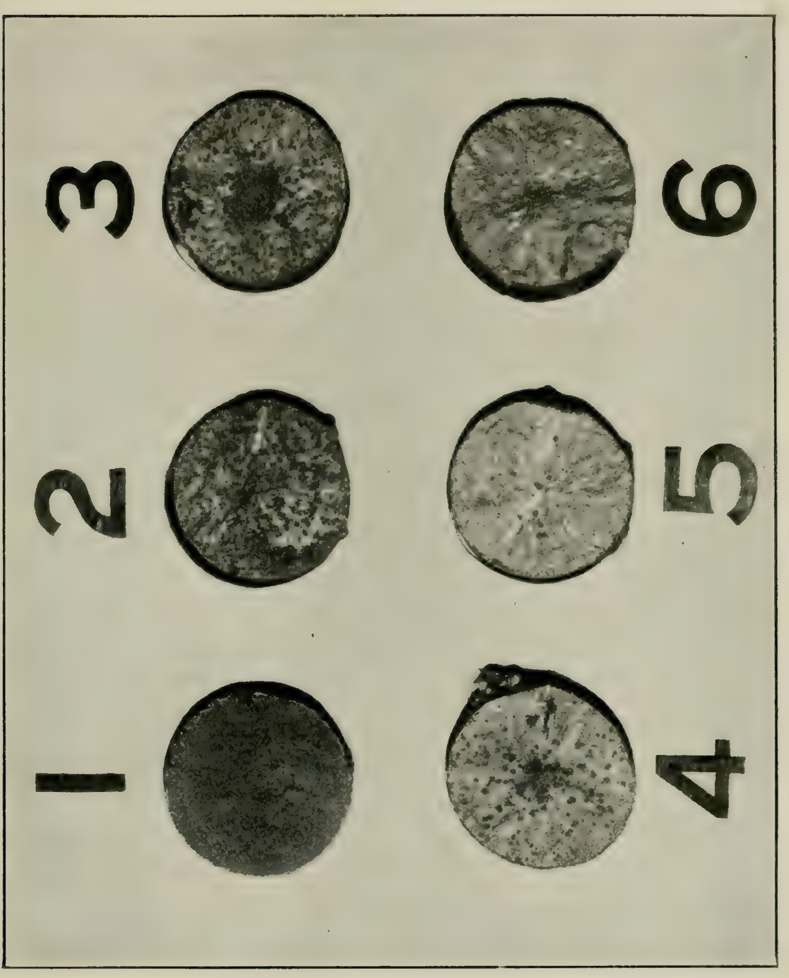
While this seems easy enough to accomplish in practice, certain precautions must be exercised in connection with the composition of the white iron, for while it has been stated that the hard carbide is unstable under high temperature, the statement must be modified somewhat by stipulating that the degree of stability depends largely upon the composition of the white iron. Either low silicon or low carbon seem to stabilize the carbide and prevent its being broken up into its two soft constituents by heat treatment, while high silicon and high carbon facilitate its decomposition, so we see that by a proper adjustment of these percentages, and attention to a few other details to which I will refer later, the manufacturer can control his product with intelligence.

Commercially, the malleable iron process is conducted in two steps, the first consisting in making a mixture of gray iron pig; sprue from some previous heat, and possibly an addition of steel in the event that the average carbon in the mixture is too high to produce the best results. In by far the largest majority of cases this mixture is melted in a reverberatory furnace, commonly known as an air furnace, from which it can be tapped in the course of some four or five hours for the average size heat. If during a heat, a test bar were poured when the charge was just melted, the fracture would be gray; because the silicon is still high enough to prevent the carbon from remaining permanently combined with the iron after solidification.

However, by holding the metal in the furnace, in order that through the oxidizing action of the furnace gases the silicon in the bath is gradually lessened, a point is finally reached where the chemical union of the carbon and iron is definitely attained, and if a bar is then poured and its fracture examined it will be found to be uniformly white throughout. When this stage of the operation has been reached, the metal should be very hot and easily fluid enough to pour the smallest castings without danger of misruns, while the silicon and carbon should be still high enough to make the carbide-of-iron as unstable as possible.

If through inadvertence, the silicon or carbon is too low, then their initial percentages in the mixture was deficient.

In Photograph No. 3 is shown the fractured ends of a series of test bars that were poured at various stages of the heat, starting when the metal was just melted and afterwards at about twenty minute intervals until the furnace was ready to tap. You will notice how the fractures grow progressively whither from the all gray to the all white one.



Photograph 3.

From what proceeds then, it is seen that the first step in the process is to make white iron castings from a mixture of gray iron, simply because if we started with a white pig-iron mixture the initial silicon would be so low that there would result a carbide-of-iron too stable to be successfully malleablized, that is, changed by heat treatment into soft iron and free carbon.

The second step in the process consists in heating the white iron castings to the proper temperature for a certain length of time, for the purpose as previously explained, of making them soft and strong.

This is accomplished in practice, by placing them in cast iron pots, where they are surrounded by a packing which should contain more or less oxide of iron. The joints and top of the pots are well luted in order to exclude air, and they are then charged into annealing ovens of appropriate design. The packing serves the double purpose of protecting the castings from serious oxidation through contact with the air, while it still has inherent in its composition enough oxygen to enable it, through its intimate contact with the casting surfaces to eliminate some of the carbon from them without causing any scale to form on these surfaces.

We will not at this time enter into reasons why a certain definite temperature should be selected for the annealing operation, suffice it to say for the present that the endeavor is to heat the castings up to at least 1450 degrees Fahr., hold at that temperature for at least 60 hours, and then allow the oven to cool with extreme slowness for a period of at least three days.

Now that we have outlined in brief manner the essential details of the process of manufacture, we will take up certain matters in connection with the castings themselves that I know are uppermost in your minds, and then discuss other matters that are uppermost in mine.

We will take up the items as follows:

First. The physical properties of the malleable iron casting, in order that you may be in a position to compare their characteristics with those of other castings.

Second. To the expose of certain fallacies in connection with the structure of this metal and the process itself.

Third. To suggestions which if carried out will result in a better understanding, and prove of mutual benefit to both the engineer and maker of the castings.

Fourth. To some quite recent but very important changes in business policy adopted by a large number of manufacturers of these castings.

Fifth. The abuse to which these castings have been subjected due to numerous causes.

Considering these items in the order in which they are set forth, we will take the first one and make record of what are acknowledged to be the desired physical characteristics that should be inherent in any casting. You will then be in a position to note through a comparison of these characteristics with similar ones possessed by the malleable casting, to what extent it approaches or falls short of this ideal standard, that is, what the virtues or shortcoming of these castings may be.

The ideal casting should possess the following characteristics:

First. It should cast free from blow holes, in order that the engineer at all times is sure that the net section at any part of a casting is equal to the gross section at that part, and in order that the purchaser will feel confident that having spent a certain amount of money in machining it he will not be obliged to scrap the casting through the discovery of blow holes.

Second. The metal from which the casting is made should be very fluid when hot, and should have minimum contraction when cooling from solidification to atmospheric temperature.

Third. The metal should machine kindly at a high rate of speed and fair feed, the machined surface being glossy and smooth.

Fourth. The structure should be what may be considered normal for the particular metal in question, and what is equally important the grain size should be the finest possible, otherwise the casting will fail to yield its maximum depandability under shock.

Fifth. The metal being ductile, the closer the elastic limit approaches the ultimate strength, the better the metal.

Sixth. The compressive strength should be high.

Seventh. Under stress, the metal should flow kindly when the elastic limit is exceeded, that is should act well under drift test.

EIGHTH. The castings should be capable of standing great abuse under shock.

NINTH. The metal should be rust resistant.

TENTH. The cost per pound should be low.

We will consider these items in the order in which they have been set forth and make note of how the malleable iron casting measures up when compared with each particular item.

Freedom From Blow Holes.

In this connection I believe it will be freely acknowledged that the malleable casting can lay claim to superiority, for it is a rare occurence to find one containing these costly and annoying defects.

That such should be the case should be anticipated from the nature of the metal that enters into the composition of these castings. The silicon content is abundant, and the carbon very high, both factors making for soundness and a metal which easily frees itself from occluded gases.

Fluidity and Minimum Contraction.

The factors that make for fluidity are first carbon, then phosphorus and then silicon. These castings contain never less than 2.40% carbon; for railway castings the silicon will average at the present time about 0.90%; while owing to the fact that the structural composition of malleable is practically all iron, free from combined carbon, the phosphorus can safely be as high as 0.250%, because it is the presence of combined carbon seemingly, that exaggerates the harmful effects of that element. Good castings can be made from this metal as thin as ordinary cardboard.

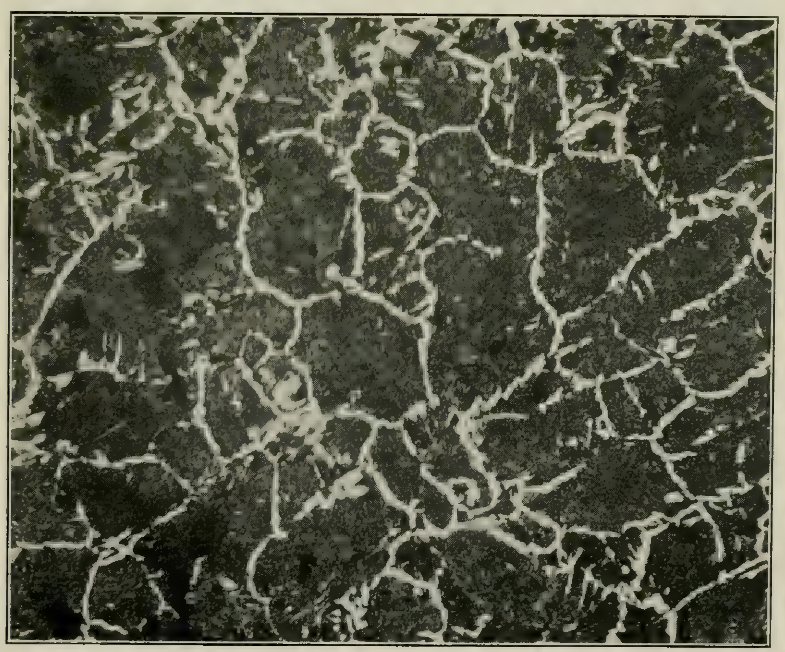
The metal contracts ¼-inch to the foot when cooling from solidification to atmospheric temperature. This of course is high.

Machining Properties and Machined Surface.

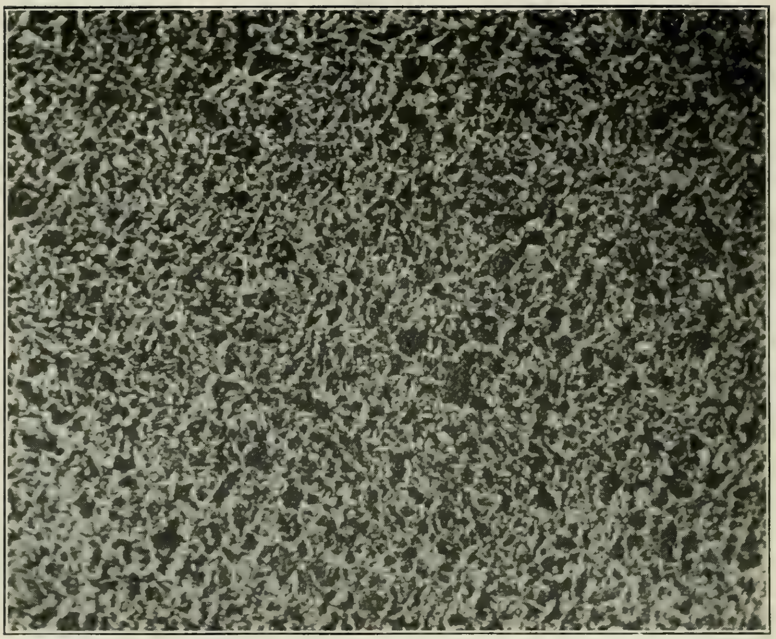
The production engineer can bear testimony to the ease with which malleable iron can be machined, and the character of surface left after machining. On this count the metal is superior in both particulars.

Grain Size.

All castings as cast must of necessity be coarse in structure, that is their crystalline grains will be large in size, because the final grain size depends upon the temperature from which the metal cooled and the rate of cooling. Assuming that the rate of cooling has been the same in each case, the structure of a steel casting will be more coarse than in the case of a malleable iron or gray iron casting, simply because its temperature of solidification is four or five hundred degrees higher than that of either of the other two. It is however possible, though it adds to the expense, to get rid of this very coarse crystallization and replace it by crystalline grains of exceedingly fine size, simply by heating the casting to about 800 degrees Cent. and holding at that temperature until the molecular rearrangement has been completed, thus converting a casting that would be wholly untrustworthy under shock, into one that would be entirely dependable. This operation is called "grain refining" or "annealing". To illustrate the effects of temperature on grain size I would ask you to compare Micrograph No. 4 with Micrograph No. 5, both taken at the same magnification.



Photograph 4.



Photograph 5.

The former is taken from a shell that was heated to forging temperature, and the latter from the same shell after it had been reheated to about 800 degrees Cent.

In the manufacture of malleable iron, the casting as cast is very coarsely crystalline, and I have already explained that when cast the iron is brittle and white and that it must be heated for some eight days at a certain temperature in order to convert it into one that is soft, strong and ductile. Now it happens that the temperature at which the castings must be held in order to accomplish his object coincides exactly with that temperature which yields the finest crystallization in the casting, so we see that without effort or aim on the part of the manufacturer, the refining of the grain is automatically carried on by virtue of the process that is required in order to convert the brittle castings into ones that are tough and ductile. From the foregoing it can be seen that a malleable iron casting with a coarse structure is a curiosity.

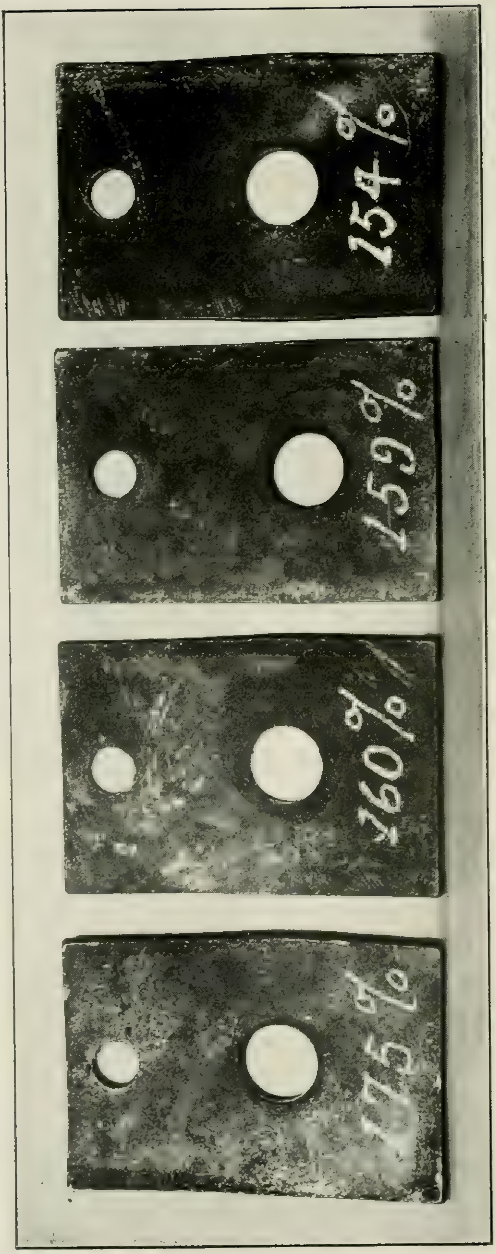
Elastic Limit and Ultimate Strength.

The elastic limit of a metal is measured by a load per square inch, such that when released, the tested specimen is found to have been stressed sufficiently to have been just permanently lengthened by thousandths of an inch only. It is the load per square inch that is just sufficient to permanently deform, and for this reason it is the factor that the engineer must know with certainty, because a high ultimate strength is of little special value to him if the structure he is building is going to alter in shape at a load far under that which will cause the members to break. Consequently, the nearer the elastic limit approaches the ultimate strength the more load the structure will stand without fear of deformation, or in other words it is better to have a metal with high elastic limit and a comparatively low ultimate strength, than to have one with low elastic limit and high ultimate strength, the metal being assumed to have sufficient ductility in each case not to be brittle. The elastic limit of fair quality malleable iron is easily 29,000 pounds per square inch, and its ultimate strength will in the majority of cases be in excess of 44,000 pounds per square inch, that is its useful strength is high, especially for a metal whose structural composition is mostly carbonless iron.

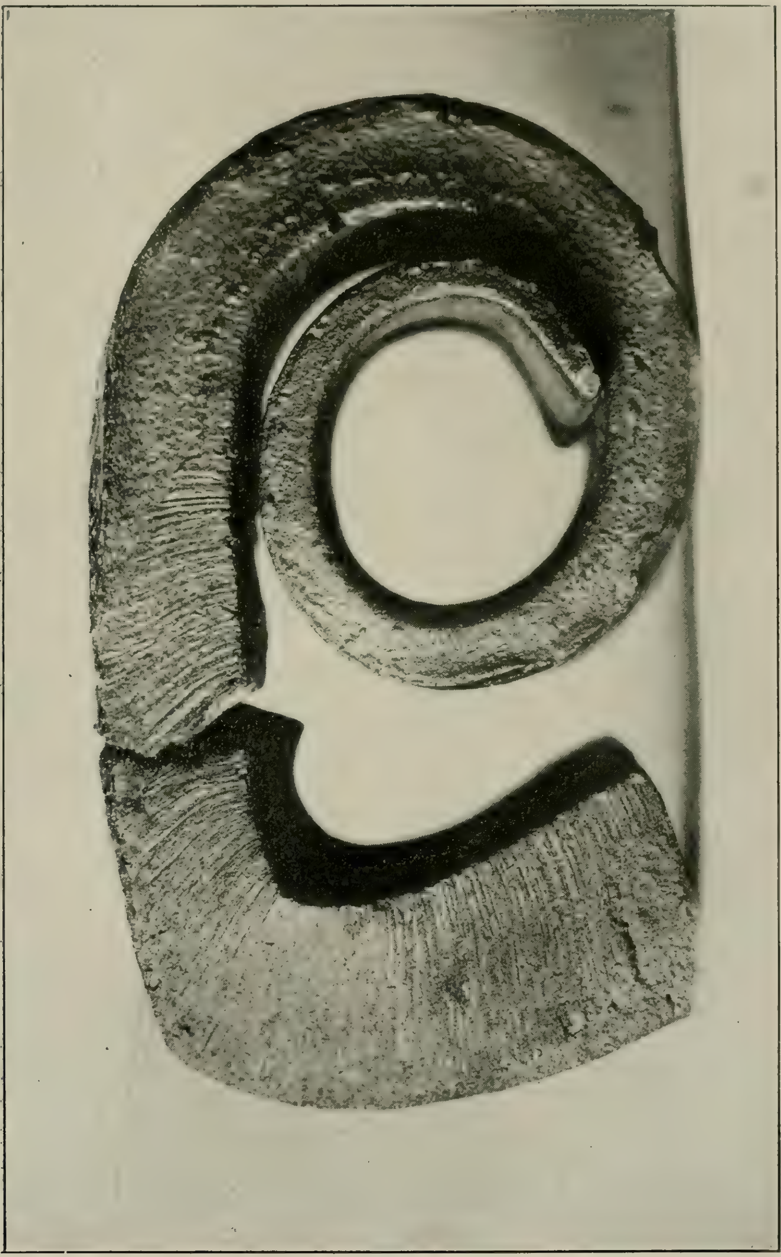
Compressive Strength.

The compressive strength of malleable iron is not high, being about equal to that of wrought iron or soft steel. Its elastic limit in compression is about equal to that in tension. *Metal should flow with facility under stress, when elastic limit is exceeded.* This is a property that is of much value in a casting that is to be used in car construction, as it is often necessary that the casting be riveted or bolted to a frame or other part, and if the drilled or cored holes do not register with the ones to which it is to be connected, they must be able to stand drifting without danger.

That the metal in a malleable iron casting can stand such treatment can be seen by reference to photograph No. 6 where is shown four plates of three-eighths inch thickness, through each of which has been drilled two three-quarter inch holes. A drift pin was then inserted into one of the holes in each plate and the hole drifted until its surface was seen to just check.



Photograph 6.



Photograph 7.

By comparing the dimensions of the enlarged holes with the originals a fair idea will be obtained as to the ability of this metal to stand such treatment.

Another interesting picture can be seen in photograph No. 7, which was enlarged to about double the size of the original. This is a picture of a test wedge that was placed under the drop of a test hammer shown in photograph No. 8, where it was placed on the anvil, held upright, and tested by allowing the weight which delivers a blow of seventy foot pounds to fall on its thin end until fracture took place. More than sixty such blows were required to break the wedge. I would call your attention to the corrugations seen on the side of the wedge which have been caused by portions of the metal slipping over contiguous parts. This surely indicates that when the metal is good, its ability to flow under excessive stress is remarkable.

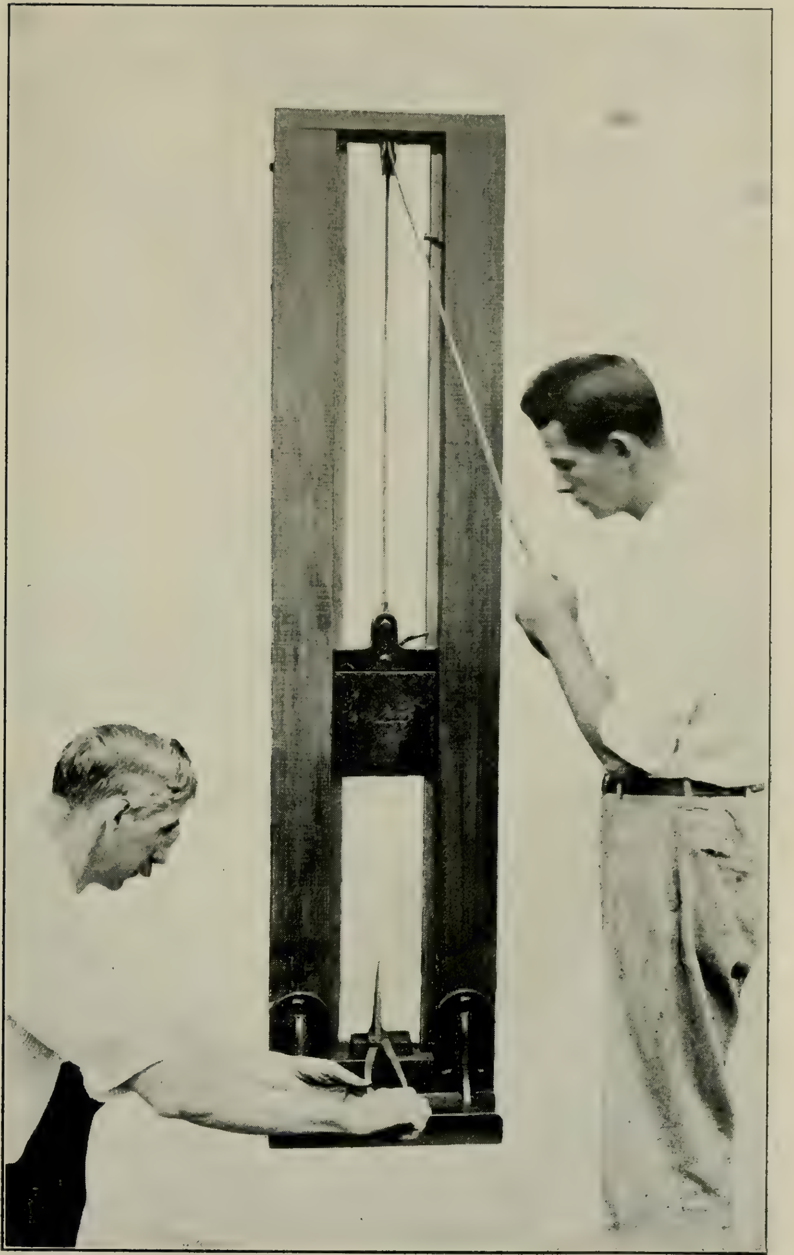
Metal Should Stand Abuse Under Shock.

This is a matter that can only be discussed in a very unsatisfactory manner, as there are many things in connection with a metal's ability to stand up under severe shock that in the light of our present knowledge cannot be made plain.

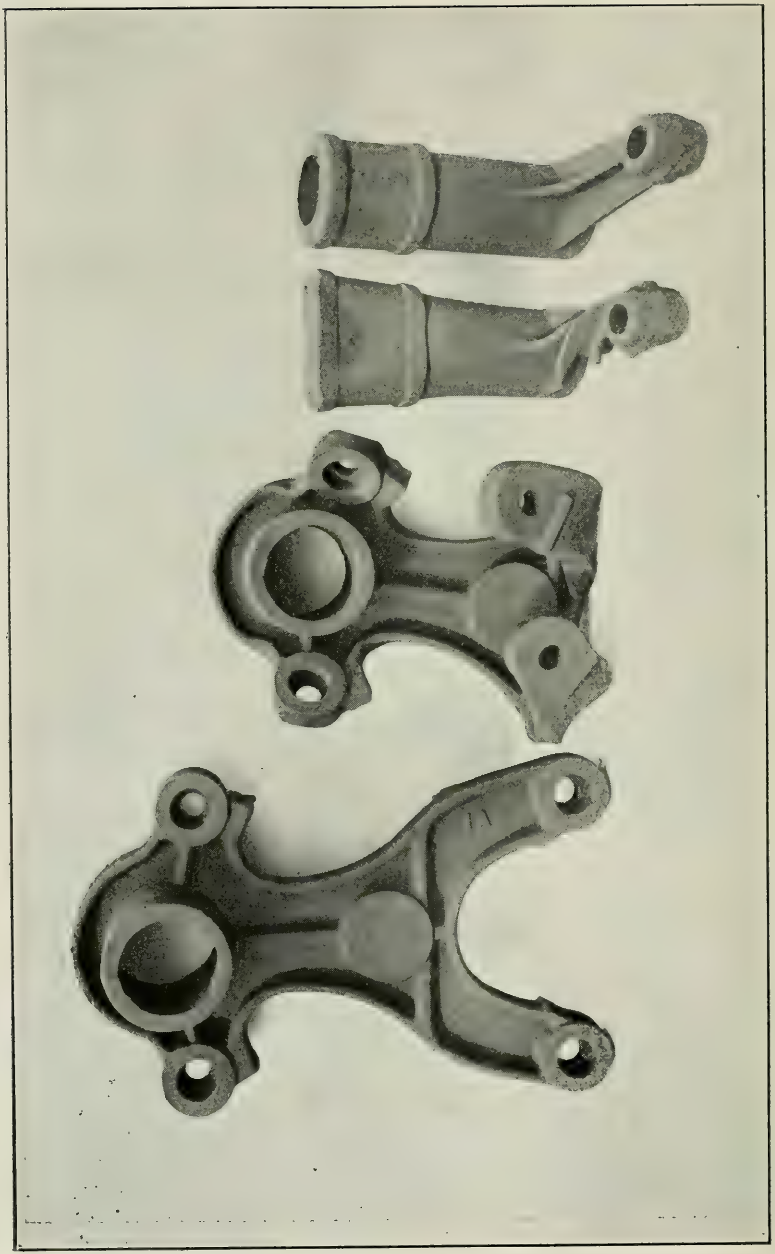
Under tensile test I have seen test bars yield results so good, that one lacking experience might be lead to conclude that the metal would stand a shock test equally well, but from a rather lengthy experience I am convinced that no test will disclose how a metal is going to act under sudden impact, except just a shock test of some kind.

Conclusions that are in any way trustworthy cannot be drawn from tensile tests, no matter how complete. The nature of the matter in the bond or cement that binds the crystalline grains together is certainly different from the material that constitutes the metallic grain itself, much more different than is implied in the seemingly accepted fact that the main difference between the two is that the grain is crystalline and the cement non-crystalline, for while this might be the entire story in the case of absolutely pure metals I do not believe it to hold good when we consider commercial products.

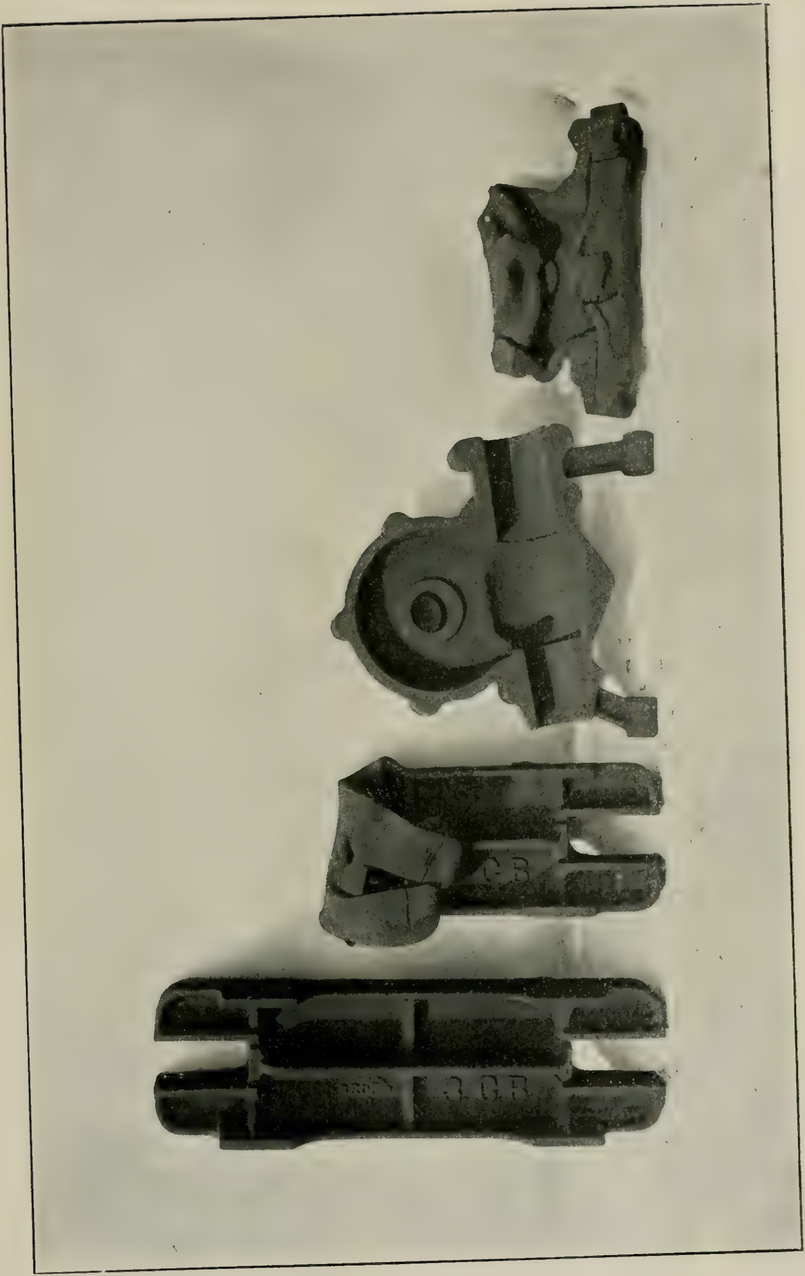
One thing we do know is that at times this bond or cement is much weaker than the matter of which the grain is composed and at other times it is the stronger of the two. I am inclined



Photograph 8.



Photograph 9.



Photograph 10.

to think that in the former case the casting will be weak to shock and in the latter it will be shock resistant, under the assumption of course that the grain size and composition are the same in each case, and the composition not such as to invite failure.

The question may now seem pertinent as to why malleable iron, in view of the large percentage of impurity contained in the metal, is able to withstand such punishment as the castings receive in service, or as shown by test bars tested dynamically. The test wedge shown in photograph No. 7 stood over fifty blows of seventy foot pounds before failure took place by fracture and in some plants this is no particular exception. In photographs No. 9 and No. 10 are shown some large automobile castings that have been sledged in violent manner and through a comparison of the distorted one with its mate you can readily see how these have been bent and twisted almost without the start of a fracture.

We all know that as the combined carbon in steel increases, its ductility lessens, and we also know that combined carbon exaggerates the evil effects of phosphorus. You have been told that the structural composition of malleable iron consists of a mass made up of grains of iron containing no combined carbon in them, throughout which structure is uniformly distributed small nodules of free carbon as shown in Micrograph No. 2. While these grains contain no combined carbon, they do of course contain the impurities that are in the iron other than carbon. These impurities however can be present in large amount we know without imparting brittleness and without affecting the ductility of the grains, due to the fact presumably that the grains contain no combined carbon. In a paper read at the Foundrymen's Convention last summer on the matter of phosphorus in malleable iron I showed photographs of wedges that had stood as high as forty blows of seventy foot pounds before failure took place, and in which the phosphorus content was close to 0.40%. As the phosphorus increases beyond about 0.250% it begins to alter the character of the fracture, giving it a more or less crystalline appearance. No such percentage is recommended of course, but there has been a great deal said in connection with the harmful effects of this element and it occurred to me to ventilate the matter a little. It will be acknowledged that any metal that will stand forty blows of seventy foot pounds on sections whose maximum, where the wedges broke, were considerably less than one-half of a square inch, is very superior. Provided the manganese and sulphur are properly proportioned, very superior metal can be obtained with the sulphur as high as 0.13%.

These facts are brought out because it is the custom of the engineer to discuss these matters from the viewpoint of steel, which is so largely influenced by the presence of combined carbon.

Most discussions are written on the subject of steel, and in this manner the engineer gets schooled along this line of argument, but he must realize that what holds good for steel does not necessarily hold good in the case of malleable iron.

The Metal Should Be Rust Resistant.

I believe it will be conceded that in commercial castings, those resist rust better that are the lowest in combined carbon and manganese, and in malleable iron combined carbon is practically absent, while the manganese should be comparatively low. I have no positive data to offer in this connection but I believe that railway men in general consider that malleable iron tie plates, rail anchors, etc., rust less rapidly than do similar castings when made of other ferrous material.

Cost Per Pound Should Be Low.

If the railway engineer entertains any doubt in this particular, I would suggest that he obtain quotations on similar castings made from gray iron and malleable iron, and then take into account the extra expense involved in making the latter over what is required in making the former. In the manufacture of malleable iron, the cost of melting is greater as it is more expensive to melt in an air furnace than it is in a cupola. Maintenance cost is higher also. When the cupola is tapped and the metal run in the molds, the castings are not subsequently heat treated; but when the air furnace is tapped, only the first step in the malleable iron process has been completed, and the castings must be heat treated for an interval of eight days. So they have this extra fuel account, and a large labor cost in addition, as the castings had to be packed in pots and then removed from them.

FALLACIES.

In connection with malleable iron as a material for use in machines or for structures, one often hears the following statements—"When the skin has been removed the rest of the section is practically useless"—"The structure is not uniform throughout any given section"—"Castings cannot be properly annealed when the sections exceed one-half inch in thickness," etc. These fallacies have gained currency through the writings of some who have posed as experts; through general ignorance as to details of the process, and through a failing inherent in many to accept what they hear as facts, and the man who does the talking as an authority. Let us take up these fallacies and see if there is any foundation in support of them. All who have had any experience in the examintion of metals by aid of the microscope and have had the advantages of even an elementary schooling in its use, know that when any iron or steel product has been heated for a period of time in contact with the oxidizing atmosphere present in the ordinary heating furnace, they can count upon seeing a border around the surface of the casting, if such it be, that will be either entirely free from carbon, or contain very much less than the part enclosed within this border. The border referred to is commonly called the "skin" irrespective of whether the material be cast or rolled or forged, although as I will subsequently point out a distinction should be made between cast and worked material.

In the case of malleable iron the skin in the majority of cases is exactly similar to the skin that is on the soft steel casting after it has been annealed, there being in typical cases no distinction whatsoever. As a matter of fact no ferrous product can be heated in contact with the atmosphere present in the ordinary heating furnace without its having a decarbonized skin, and in this particular malleable iron is no exception. In a paper written for the American Foundrymen's Association I entered into a discussion of a comparison between the strength of metal in skin and core, and it was demonstrated that in the case of a bar whose ultimate strength would run 41,000 pounds per square inch, if the strength was mainly in the skin, the metal in this skin would have to stand about 100,000 pounds per square inch to enable the bar as a whole to register 41,000 pounds. As a matter of fact, a great deal of malleable made for railroad work will average as high as 48,000 pounds per square inch, in which event the metal in the skin would be required to stand over 115,000 pounds per square inch to bring the bar as a whole up to the former figure. What can be said when the ultimate strength runs up to 55,000 pounds as not infrequently happens, this being the goal towards which the malleable manufacturer is at the present time aiming?

In connection with rolled steel, it is I believe conceded that the strength of the steel with the skin removed is not as strong as when tested with the skin on, but I would point out that in this case there are certain things to consider that do not obtain with cast materials.

When metal is worked as in rolling, the influence of the work on the surface of the piece is much more effective than towards the interior which makes for greater strength and tenacity, and in addition to this investigation will disclose the fact that the size of the crystals in the metal of the skin are smaller than those further in towards the center, which also adds to the strength and tenacity of the skin, so that it is to be expected that the skin of rolled material is stronger than the metal that it encloses, but such is not the case with good malleable iron, at least to any appreciable extent. Experimentors who have written on this subject I believe have been misled chiefly through the selection of either poor material for their tests, or test specimens which owing to interior shrinkage give false results. Poor and badly annealed malleable iron often does have a skin, which may be both bad in quality and better than the interior, while also, if improper designed and gated test bars are used for this experiment, it is to be expected that the unsound material that forms a good part of the interior will not show up to advantage, but in the paper referred to is a record of results of tests made on bars properly made for this test, and these tests do not show that the skin adds materially to the strength of the bar.

Concerning the statement that the structure of a malleable casting is not uniform throughout any given section would state as follows:

There is just one way to ascertain the truth or falsity of this statement and that is through the aid of the microscope, though theoretical considerations alone should indicate that there can be no truth to it. The structure of white iron is uniform no matter how thick the section. To anneal white iron, that is, convert it into malleable iron, all that is necessary is to heat the iron up to the temperature of about 1450 degrees Fahr., hold it to that temperature for some 60 or more hours and allow it to cool very slowly for some three days. The structure of the white iron consists of the two constituents, cementite, and pearlite, and annealing in this case simply means the breaking up of the hard carbide into soft iron and free carbon, by means of heat. I have stated that to anneal, all that is necessary is to heat to about 1450 degrees Fahr. and hold at that temperature for a certain length of time. If this is all that is required, *and it is all*, then the only question involved as to the possibility of annealing any given section uniformly throughout lies in ones ability to heat the section uniformly throughout, and as pieces of steel and other materials are being continually heated uniformly throughout their bulk having sections frequently a foot thick, it is difficult to understand why malleable iron should form an exception to the rule. If then, any thickness of malleable iron can be heated uniformly throughout, it can be uniformly annealed; first because the structure of the white iron is uniform throughout to start with and as the breaking up takes place "in situ" the resultant structure must be uniform. However, to make a practical illustration that should satisfy the most skeptical, I requested a friend to cast a piece of white iron 2 inches in diameter and 6 inches long and to anneal it in exact accordance with their usual practice. This was done and after the receipt of the piece, a section was cut from it; polished and etched. and examined under the glass. With the exception of the narrow decarbonized border, the secetion is perfectly uniform throughout, and if the observer were uninformed as to the spot he was examining under the glass, he would be unable to designate, except by guess, whether he was looking at the center or at a spot in close proximity to the surface.

The above explanation should serve to also clear up the false statement, that when sections exceed ⅝ths inches in thickness they cannot be properly annealed. There is no more truth to this statement than there is to the other. It is true that during the annealing process, while the hard carbide is being broken up into soft iron and free carbon, some of the carbon is being removed through the oxidizing influence of the packing which surrounds the castings, and it is also true, for obvious reasons, that more carbon will be removed from a very thin section than from one much thicker, but the structure of the thin section will be uniform throughout and so also will the structure of the more thick one, though the thicker one will contain more total carbon. The difference in the amount of carbon removed between a piece as thin as 1/16 inch and ½ inch would be very considerable, but the difference in the case of a piece ¼ inch and ½ inch would be inconsequential.

SUGGESTIONS FOR MUTUAL BENEFIT.

We are all familiar with the pattern that causes infinite trouble due to faulty design; the one that through proper changes here and there can be made to yield stronger castings that may be made even lighter in weight than when cast from the original pattern, if only the designing engineer would listen to the voice from the foundry and permit it to be altered to accommodate the peculiarities of the metal for which it is to be used.

Failure to permit this has caused the industry great harm in the past, due to the impossibility in many cases of securing castings free from weak spots caused by shrinkage, that is, the metal might be of splendid quality as shown by tests made on strips cut from different parts of the castings, but the pattern so designed that one part would have a tendency to pull away from or feed another while solidification was taking place, resulting in a casting which taken as a whole could not be strong; but deficient in strength through no fault of the manufacturer who had accomplished with the pattern furnished him the best that was possible.

Such castings naturally have a shorter life than should be the case, and not only serve to discredit the metal in the eyes of all whose attention has been attracted towards them, but based upon the poor results obtained through their use, it is at once decided by the management that in the future, castings for this structural detail shall be made of steel.

However, to bring about this change, the pattern must now be altered, and this time, the advice to alter the pattern is heeded and success attained, not only through a removal of the essential defects of the pattern but through a thickening of the sections to accommodate a more sluggish metal. While attention is called to this condition, matters in this connection have continually improved and in a great many instances the engineer consults with the pattern-maker before putting the finishing touches to his work. It will take a long time, however, to remove the ill effects that just this one factor has had in bringing the malleable casting into disrepute in the minds of many who have not had the time or opportunity to investigate for themselves.

I believe a very interesting monograph could be written, in which could be shown through proper illustrations what failure to co-operate has meant in the past to both parties, and what it means now, as against the more progressive and up-to-date plan of mutual assistance.

Properly presented facts of this kind might serve the purpose of more quickly convincing the engineer that this is surely a policy that common sense dictates should be adopted.

IMPORTANT CHANGES IN BUSINESS POLICY.

Matters under this head must of necessity be somewhat historical.

Some forty years ago, owing to the rapid development of the west, and the natural growth of the country in the east as well, there was an ever increasing demand for the gray iron and malleable iron casting, for use chiefly in connection with the railway and agricultural implement business.

While the cost of installation of a first class foundry equipment of any kind runs into considerable money, it is possible to start, in a very modest way, and this was the case especially at a time such as I have depicted, when the demand for the product was great and the profits large; while from the quickly accrued gains, a very modest installation was soon converted into one much more pretentious. However, while the plants grew in size and number, very little, if any, attention, with perhaps one or two exceptions, was given to a systematic attempt to improve the process by taking advantage of the advances that had been made in metallurgical knowledge in general, as was being gradually done by the steel companies particularly, and by other industries as well.

Strict attention was however invariably concentrated on anything that might tend to cheapen or increase the tonnage. The attitude of the manufacturer was to be secretive, for while he reasoned that scientific investigation might improve his product, he was selling all the castings he could make, was doing a splendid business, and it seemed clear to him at the time that to throw open his plant to the investigator would operate to make the manufacturing details known and in this manner competition would be invited, and he would in the end lose more through this procedure than through lack of progressiveness.

There is no question but what he reasoned correctly up to a certain point, but such a policy eventually leads to trouble, in a manner that at the time was not anticipated, for in the natural course of events, cars, agricultural implements and machines had to be cheapened; castings to meet these conditions had to be lightened, and the product was continually being measured by higher and higher standards, and castings that previously would have been accepted, were now being rejected. Through his short-comings, the founder who by reason of his inferior work had to be continually looking for new custmers, or for ever apoligizing for his product has caused almost irreparable injury to the few who had at that time already seen a light. Those who saw the necessity of making every possible effort to improve their product as to quality grew in number, but found it hard to shake off and neutralize the bad impression that existed and still exists in the minds of the user and purchaser, the inevitable outcome of the situation I have described.

There were those also who for selfish reasons have not hesitated to misrepresent the product and add to the doubt already existant in the minds of engineers and others as to the quality of malleable iron.

The magic word "Steel" appears to be a sufficient safeguard for the steel-maker, for when such castings are bad the process is not criticised, but the individual maker is condemned. In the case of malleable iron however, should the product prove inferior the maker is apt to be excused and the trouble laid to the process.

Realizing the false position in which the industry has been placed by the manufacturer who has not kept pace with progress and who consequently cannot make good castings; by the harm that has resulted and still results through the attempt to furnish castings from badly designed patterns; by the lack of true information possessed by the average engineer in connection with this product; by the lack of any reliable literature, on the manufacture of malleable iron, aside from a few fragmentary articles and papers; it was some three years ago decided by a certain number of manufacturers of these castings, to join issue for the common good and through co-operation spend any amount that might be required to ascertain in what direction the product could be improved as to quality particularly; by standardizing methods of testing and inspection and by having their works periodically visited by highly specialized metallurgical engineers whose duty it would be to pick any flaw in product or process, inspection or test.

How this important change in business policy has been undertaken and what has been accomplished will now be very briefly described.

The work first undertaken was a complete study and investigation of the metallurgy of the process to ascertain just what was the interdependent relationship between the different elements in the iron, as affecting both the air furnace work and the annealing. The changes that occurred during the annealing process were then investigated through a systematic study of many samples from many plants.

As it was fully demonstrated by the bureau that the results of a tensile test was in no sense a measure of what the metal might stand under shock, and as most castings of malleable iron are subjected to dynamic stresses when in service, it was decided to design a testing machine and adopt a test bar for this purpose, which would show just what might be expected from the metal when subjected to shock. At the present time all of the companies who are included in this group of manufacturers are making daily tensile and dynamic tests from test bars that are identical in shape and on testing machines of the same design.

It was then decided that all testing records would be uniformly kept, and to this end a chart was printed on cross-section paper on which could be drawn a curve that would represent the results of the tests of the product from each heat for each day of the month. In this manner it is now possible for any manufacturer to compare what he is doing as regards quality with any or all of his fellow members. At the end of the month an average of the results of the physical tests for that month is computed and these figures sent to the bureau. Similar figures from all the members then form data by which a curve can be plotted that truely represents what the membership as a whole is doing, and these monthly curves are compared at each monthly meeting to see if there is an improvement in the product of the association as a whole, while through this procedure a means is also at hand through which the benefit that is being derived from the work of the bureau is measured. I might add that all members are required to send daily test bars to the bureau as a check on their own tests.

If any member meets with difficulty the bureau engineer visits the plant, and if the matter is new and it is thought would prove of general interest to the membership, a full report is made, to the end that each member will receive the benefit of that particular investigation. Little by little a vast fund of information has been accumulated concerning the metallurgy of the process, that prior to this work was not fully understood, and which has not only served to do away with nearly all irregularity of product from day to day, but which places the manufacturer in a position to guarantee his product as being uniform, dependable and superior.

The Use and Abuse of the Malleable Casting.

In the text that has preceded I have made some reference to the items under this caption. You are interested particularly in castings used in car equipment and tracks; such castings as are known to you and your inspectors under the name of column posts; brake beam struts; cheek plates; push pole pockets; striking plates; coupler carriers; back stops; side bearings; sheave wheels; tie plates; rail anchors, and a multitudinous lot of others.

The use of these castings is wide and varied and no further remarks are necessary in this connection; but in regard to the abuse that has been laid not too lightly on these castings, there are certain facts on which I would like to dwell. First and foremost it is acknowledged that no one is more responsible for their abuse, all along the line, than the malleable iron manufacturer himself, for which short sightedness he has had to pay most dearly.

For many years he was indifferent as to quality, if indifference can be measured by a neglect to follow the footsteps of the steel men to abandon rule-of-thumb. As a corollary to this, he was willing, if not actually forced through self-preservtion to allow to "get by" any castings that were true to size and free from surface imperfections, when he was conscious that the quality was bad.

The material was not dependable and abuse followed, because not only was he unacquainted in large measure with the metallurgy of the process, but he did not realize the importance of annealing furnace control; temperatures were estimated solely by the eye and no provision was made through which could be ascertained the temperature at different parts of the oven; a matter of vital importance.

Again, the integrity of the casting as a whole was not given the attention the matter deserved, and shrinks were driven to less harmful localities, rather than removed altogether. From this cause failure resulted, often when the metal was actually superior as shown by test strips cut from solid portions of such castings; troubles which could have been avoided had he known then what he knows today.

I feel no hesitancy in stating that such conditions as I have described no longer exist in the manufacturing plants of the organizations of which I have made mention, but if these happenings have since been forgotten by them, the recollection seems to still linger by the engineer and prejudice his attitude towards malleable iron, so how could the manufacturer have abused the castings more than through the facts that I have cited.

Today, as I have stated, no such conditions exist in these plants for they positively know the best mixture, which when made into white iron castings and properly annealed will produce a very superior product, not once but practically always. The reaction that takes place in the air furnace is familiar to them all and these furnaces are run with intelligence. Annealing oven temperatures are all gauged, not by eye as was formerly the case, but by recording instruments attached to a pyrometer equipment. Thermo-couples are permanently inserted in several places in the ovens, and in addition to this, openings are available for the introduction of elements at intermediate localities as a check and to make sure that uniformity exists in all parts. At any moment the superintendent has it in his power, through the turning of a switch, to ascertain the temperature in any oven under fire. When a new casting is to be made, a scientific study of the gating and proper height of head necessary to produce absolute freedom from shrinkage is undertaken, and trial white iron castings are made simply for the purpose of breaking them up into small pieces in order to see if a shrink has formed at any part, which procedure is continued until all signs of shrink have disappeared and the casting is equally solid throughout.

No manufacturing establishment can of course be run at 100% efficiency, consequently to take care of the inevitable these plants have their own inspectors, and when through inadvertence a heat is found that does not measure up with the high standards that have been adopted, they have full authority to scrap the castings and prevent shipment.

Now as to the part that the engineer has played in the abuse of these castings. What can be said of the engineer who designs a "push pole pocket" with only a ⅛-inch section of metal? Can a similar casting made of any metal stand up in service, and should malleable iron be censured when it fails under such circumstances? Is there any one here who doubts for a moment but that a malleable iron push pocket would be practically indestructible if properly proportioned for the stresses to which it will be subjected? How about the abuse this metal has been made to bear through failure on the part of the engineer to properly design the casting, avoiding as can be done in many instances an uneven and unwarranted distribution of metal, a case that is general and not by any means exceptional. I believe that neglect to properly design parts that are to be made of malleable iron is responsible for 80% of the failures, and if the pattern maker at the foundry were consulted it is certain that he could demonstrate very quickly his ability, not only to alter the pattern in a manner that would frequently lighten the casting, but at the same time add to its strength.

I would point out in this connection that when the engineer attempts to cheapen the casting by making it lighter, he as a rule defeats the ultimate aim, because through his method more cores must often be used, and while there may be less metal in the casting, the cost for molding is increased and consequently a higher price per pound must be asked.

Finally, I would point out that in nearly every case that has come to my attention where it has been decided to change from malleable iron to some other metal, the pattern has been altered to suit the characteristics of that metal by making it considerable heavier. If the pattern was originally too light in design, this should not be charged against the former and credit be given the latter, and still this is what actually has happened in the past and to a large extent is taking place today.

The engineer should awaken to the fact that a new era has dawned as far as the malleable iron casting is concerned, and that he now has available for use in car construction a casting that is dependable; that is strong and at the same time ductile and which when cast from a properly designed pattern will stand up in service under even every unreasonable conditions.

DISCUSSION

PRESIDENT McNULTY: The hour is somewhat late, but we would like to hear some discussion of this very interesting paper.

MR. D. F. CRAWFORD: I doubt very much if any of us are prepared to properly discuss this most able paper. To me it has been not only intensely interesting but most instructive, and I am quite sure the other gentlemen present feel the same way about it. I would like to move a vote of thanks to Professor Touceda for his very able, most interesting, and surely most instructive paper.

The motion was seconded by Mr. Code, and unanimously carried.

MR. A. STUCKI: The importance of the subject this evening certainly warrants some remarks.

The annealing for instance is usually considered a chemical process out and out, but the author has shown us that it consists of two items, the change of structure due to the heat treatment and the decarbonizing, due to the packing material, and with this information it is possible to explain why even the center of heavy bars, say 1 inch or 2 inch thick, can be "annealed" to a very large extent.

Another point well presented was that in regard to shrinkage cracks and other foundry defects. In designing car and locomotive details for twenty or more years, my experience was not always pleasant and whenever we had defects in the castings, we simply blamed it on the design, but tonight the author showed us that even after the design is right, a great many precautions are necessary in the foundry to get a good casting. From personal experience, I know that the sinkhead mentioned will produce a far superior product and I feel confident that with such precautions as enumerated by Prof. Touceda, the malleable casting will regain its prestige to the fullest extent, especially in those fields where a ductile casting is desired.

PRESIDENT: May we hear from Mr. D. J. Redding?

MR. D. J. REDDING: I do not know very much about malleable castings, but I could not help thinking of a remark made by Mr. Lanahan, who is, I believe, engaged in the malleable iron business, at a meeting we had some time ago when steel castings were being discussed, that he was like a colored man who was hard up and did not know where he was going to get his next meal. Going along the road, the twelve o'clock whistle blew and men poured out of a factory, rushing to various eating places, and the negro said "That whistle means dinner time to a lot of men, but it is only twelve o'clock to me." From the facts brought out in this paper and the discussion that has so far taken place, this meeting tonight indicates a full dinner-pail to Mr. Lanahan and his associates in the malleable iron business.

One of the points brought out in the paper tonight is that malleable iron is not merely improved on the surface by the annealing process and thereby made better than gray cast iron, but is a better and stronger grade throughout its entire structure, and it may be that when this is understood and users of steel and iron become more familiar with this fact, and assured that the high standard of manufacture described in this paper will be maintained, many parts now made of cast steel may be replaced by malleable iron.

It seems to me that there may be a great many places about cars and locomotives where properly designed and constructed malleable iron castings can be used to good advantage where we are now using steel, and, I rather gathered from some remarks made at another meeting that later on we would hear something about the construction of arch bar trucks, using malleable castings to take the place of cast steel side frames under cars. Everybody knows there has been some trouble with cast steel side frames. I hope the malleable iron people are pushing that and that it will receive some impetus as the result of this meeting.

PROFESSOR TOUCEDA: I would like to say that one of the reasons why the railroads have had a little difficulty in getting reliable Malleable Iron is due to the fact that they shop too much. The Purchasing Agent is purchasing castings that are satisfactory, but being a Purchasing Agent, he wants them a little cheaper. Well, you can get them cheaper. But how do you know that you are going to become connected with a foundry that knows how to make them? If the railroads will stop that bad habit of shopping, they will have better success in regard to quality.

MR. FRANK J. LANAHAN: I should like to have the Secretary make a record of the last remark made by Professor Touceda as to the Isrealite tendencies of the Purchasing Agents, and please show plainly on the minutes of the meeting that it was not a malleable iron man that was responsible for these sentiments, however, I would add (sotto voce) that I am absolutely in accord with what Prof. Touceda says.

Mr. Redding referred to a story that was told by your humble servant at a previous meeting. The situation tonight brings to my mind another story a little different in its construction. I am somewhat reminded of that big handsome Irish policeman who stands at the corner of Smithfield Street and Sixth Avenue. He is stationed there on account of his physique and his ability to handle the heavy traffic. As you all know, when the whistle blows and his hand goes up all traffic stops. During the busy part of a certain day when the whistle blew and he extended his hand, right in front of him was a fine big Pierce car. It stopped. Back of it was a measley Ford. This little jitney did not stop but ran into the fine Pierce car, broke the lamps, damaged the mud guards and considerably disfigured some of the paint. The fine looking policemen went over to him and said in his inimitable brogue, "When I put up me hand and blow me whistle it m'ans stop. Why dy'dn't you stop?" The driver said "I thried to, sor." "You didn't do any such a thing and I am going to turn in an information against you. What is your name, "Patrich Clancy, sor." "Are you any relative of Jemmy Clancy that has the saloon on the other side of the river?" "Sure, he is me cousin." "Wait a bit," said the officer. Then the policeman went up to the follow that ran the Pierce car and said, "Say you, when I say stop, it don't mean for you to back up."

The application of the story is plain. The meeting to which Mr. Redding refers resembles the Pierce car, but I guess tonight, like the jitney in the story, malleable iron has a little favorable consideration.

MR. HARRY HOWE: In the light of what has been said tonight with reference to malleable iron, a few words in regard to a test made some time ago by the Pressed Steel Car Company, may be of interest. In line with other investigations made by them in connection with values of materials, it was decided to ascertain, if possible, the relative values of different thicknesses of malleable iron, and test bars were made from ¼-inch to 2-inch thick, rising by ⅛-inch to 1-inch and by ¼-inch from 1-inch to 2-inch. This gave us 11 different thicknesses, and the bars were all made so that the width was three times the thickness and of the standard test bar length, 18 inches over all, with the part of the bar to be gripped by the jaws ⅛-inch thicker than the body of the bar. These were for the tensile tests. For the transverse tests the same cross sections were used but the length of the bar was in each case 12 times the thickness and the supports or wedges on the machine were set ten times the thickness of the bar apart and a pin of the same diameter as the thickness of the bar was used on the compression head in bending the bars. The readings for deflection in the transverse tests were given as the degrees of the angle formed by the bend together with the load applied.

The intention was to make the test as near to practical conditions as possible and to accomplish this in the foundry three pieces of each size, both tensile and transverse were made from one heat on six different days, this being done to give a fair average of the work. As a result the average tensile strength of 17 pieces of the 2-inch by 6-inch bars was 30,000 pounds per square inch, which increased steadily through the different sizes to an average strength of 41,000 pounds per square inch for the ¼-inch by ¾-inch size. It should be borne in mind however, that the heavier sections could be made much stronger by the usual foundry precautions of using heavy risers or chills or both on the heavy sections or changing the mixture to suit the heavy work in the event that all heavy work was to be made, and due credit must be given the man who develops a mixture showing such good general results. It is well known that shrinkage metal in malleable castings is a weakness, but as to how weak it is, very few people are informed. I had one piece of a 2-inch by 6-inch bar which had been pulled, sawed lengthwise and each piece turned down to .564 diameter and pulled with the following results: The original bar broke at 31,334 pounds per square inch, one side section after being turned down, at 39,720 pounds, the other at 40,920 pounds, and the center section which was mostly shrinkage metal at 11,320 pounds. In the transverse tests the standard formula for strength of beams was applied to the figures developed and a numerical factor for comparison was thus arrived at showing 69,000 for the 2-inch by 6-inch section increasing steadily to 105,000 for the ¼-inch by ¾-inch which is accounted for by the shrinkage in the heavier sections as the usual foundry precautions to eliminate same were not employed.

These figures have been used to develop graphic curves of which I have a few prints which I will pass around so that the members can look them over with the hope that this much abused product may be given a little more consideration in the future.

MR. WM. J. KNOX: I would like to ask the Professor, assuming malleable iron and steel castings to be of equal price per pound, if he has determined from his tests and investigations the limit of sectional thickness and weight where it would be economical to use malleable and where steel? While the steel casting, is certainly the stronger metal per unit of section ordinary commercial steel castings are not very successfully made in thin sections while malleable castings are readily so made.

PROFESSOR TOUCEDA: No steps have been taken to ascertain this in the manner in which the question is asked. But in answer to the remarks that have just been made, I would say that I think one of the short comings of the malleable casting is the fact that in the past, it has not been wholly sound due to shrinkage. Assuming that they have been made of a good mixture, certain portions of the casting will test splendidly, but if you take a part where there is a shrink, it will be weak. But as I tried to bring out in the paper, that these difficulties are being overcome largely. I have a point in mind now, wherein a concern making a ⅜-inch by 1-inch rectangular test bar stood only 30,000 to 35,000 pounds but the ⅝-inch round bar stood 43,000 to 50,000 pounds right along. They could not get over 35,000 pounds on a 1-inch square bar to save them, simply because those bars were not sound, due to faulty gating and these people referred to did not seem to know how to make them sound.

So that I think a lot of the conclusions have been drawn from tests made on bars that were unsound. It is folly to expect to obtain a reliable malleable casting unless you first make a sound white iron casting. That is the direction in which the Malleable manufacturer is working today.

MR. KNOX: Are there certain lines of castings that malleable is more suitable for than steel and vica versa? Apart from the fact that you are lecturing on malleable iron, in your judgment would it be desirable to use malleable cast iron in preference to steel for driving boxes; for corresponding strength would a steel box not be lighter, better and cheaper than one of malleable iron? Are there not some lines of castings for the manufacture of which you would recommend malleable as preferable to steel and vica versa?

PROFESSOR TOUCEDA: I think each metal has its particular field. There is a field where the Malleable Casting has no business to enter, but I feel just the same about steel. There is no sharp line of demarcation. I might make up my mind about it later, on reflection, but I could not tell you offhand. You will always find a malleable casting a sound casting, when you come to consider blow holes apart from shrinkage. When it is unsound, it is generally found to be due to shrinkage and not to blow holes. I think that the steel casting is liable to be unsound, due to both, in many cases.

MR. KNOX: I would like to ask just one more question. We have been given to understand that in designing malleable castings it is best to use thin sections and numerous ribs to stiffen and strengthen the sections rather than to make thick and plain unribbed surfaces. Do you still recommend this as the best practice?

PROFESSOR TOUCEDA: In Malleable castings the essential thing is to make the castings proportional, not have very thin sections connected with very thick ones. But that is also true of steel in a large measure although the harmful effects are not felt as much in steel as in Malleable iron. But when you have castings with 3-inch thick section attached to one of ⅜-inch it is a very difficult proposition and can only be done through the use of a lot of shrink heads that have to be remelted and special gating and contrivances of that kind. Malleable Iron has a wide field of usefulness and there is no question that it is increasing all the time. But there are some manufacturers of this material who have not yet seen a light. They are behind the times and do not see the necessity of adopting modern methods, and as long as the railroads will not see to it that they deal with people who are not behind the times they are going to get castings that are not satisfactory. That holds true in every line.

MR. C. H. GALE: The paper spoke of the erroneous idea that malleable iron could not be handled thicker than ½ to ⅝ inches. I do not think that is true. Mr. Howe spoke of some 2-inch by 6-inch in thickness. I would like Mr. Howe to say if he found those sections thoroughly annealed.

MR. HARRY HOWE: There were better than 400 bars all told, and they were all *thoroughly annealed*. In regard to the question of shrinkage there were some special bars cast in which the shrinkage in the entire section was absolutely eliminated, and in those bars we got especially good strength. I think Professor Touceda's remarks in regard to the weakness of the larger bars is borne out by the tests of the one bar that was sawed lengthwise to get at the heart of the metal and get the difference between good metal on either side and the heart which was not so good. As a matter of fact we got metal of about four times the strength in the side sections that we had in the center section due to the shrinkage. But we subsequently made some test bars which were absolutely sound as far as shrinkage metal is concerned, and gave us considerable trouble in the testing machine. When you pull a 2 by 6-inch bar you have some pull. It does not let down like steel. The reduction in area is not much and you get quite a reaction in the machine when it lets go. I believe when the entire figures for this test are available it will be quite an addition to the literature of malleable iron. I have consulted other authorities and I have not been able to find anything in the literature of malleable iron that covers as comprehensive a test as the one carried out by the Pressed Steel Car Co.

MR. A. M. FULTON: With reference to the inquiry, as to how thick a section can be made of Malleable Iron, would state that the Fort Pitt Malleable Iron Co., with whom I am connected, are making at the present time, a large order of Striking Plates, with a buffing face of 1¼-inch thickness, reinforced by ⅝-inch thick ribs, for one of the railroads. We take care of this unequal and apparently thick section of Malleable Iron by proper gating and feeding, with a head of sufficient size to feed up any possible shrinkage that would exist in a casting of this proportion.

On the Plate which is now on the screen, is shown the following castings:

Center Sill Separator, for P. R. R.
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The Separator which is shown on the left of the Plate was formerly made with chills located at the junction of the side walls and the vertical rib in the center. This method was used in order to eliminate the shrinkage at this point.

From experience, we have found that the correct way to insure a sound casting of this design is to feed the castings with properly designed heads, which course we are now pursuing.

With correct Gating and Feeding methods and the proper mixture, we can take care of any reasonable section and make a perfectly sound and serviceable Malleable Iron Casting.

MR. STUCKI: I would like to ask whether or not there is any difference in the results of different packing, and if so, what are the relative values of box packing or bulk packing.

PROFESSOR TOUCEDA: The character of packing used as a packing for Malleable castings is usually oxide of iron and the stronger the packing the better the results. The more iron oxide the more active the packing and more efficiently it will decarbonize. In the ordinary packing of a pipe fitting, that is small with a section not more than ⅛-inch or 3/32-inch you can eliminate nearly all the carbon. Starting, with a carbon of 2.70 in the mixture you would not have any more than about 2.40% in the white iron casting and in the average casting, this might be reduced to 1.90% carbon. So you get rid of a large amount of carbon in a casting dependent upon thickness of section. It is very desirable to get rid of all the carbon in a casting that is possible when you anneal it and that is done by the use of a strong oxide packing such as furnace slag mixed with a large percentage of mill scale, which is strong oxide of iron.

MR STUCKI: What I meant was whether it is better to pack in boxes than in bulk.

PROFESSOR TOUCEDA: Open Annealing? You must not think that you do not get rid of considerable carbon in Open Annealing, because you do. If you were to heat iron in an open furnace there is so much oxygen in the furnace gases that you would not only get rid of much carbon, but also of considerable iron. You form a scale which lessens the section. The object of the packing is to prevent too much oxygen getting to the casting. In the Open Annealing the muffle is sealed almost absolutely tight and only enough air gets in to furnish the amount of oxygen that would ordinarily be furnished by the packing, if they were using packing. There is not enough of oxygen in the atmosphere in the muffle to attack the iron, so they accomplish the same thing in the muffle as they do in the packing.

PRESIDENT: Have any others anything further to say? If not I will ask the Professor to close the discussion, if he has anything more to offer.

PROF. TOUCEDA: I haven't anything further to say, except to thank you very much for the attention you paid to the paper.

There being no further business.

ON MOTION, Adjourned at 10:45 P. M.

J. B. Anderson
Secretary.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of February, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.
SUBJECT—"Pulverized Fuel for Locomotives" by J. E. Muhlfield.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.
SUBJECT—"Our Express Business" by C. W. Robie.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.
SUBJECT—"Car Construction" by K. F. Nystrom.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.
SUBJECT—"Electrification" by C. H. Quinn.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.
SUBJECT—"The Universal Valve" by W. V. Turner.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.
SUBJECT—(not obtained)

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.
SUBJECT—(no meeting)

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.
SUBJECT—"Malleable Iron—Its Use and Abuse" by Prof. Enrique Touceda.

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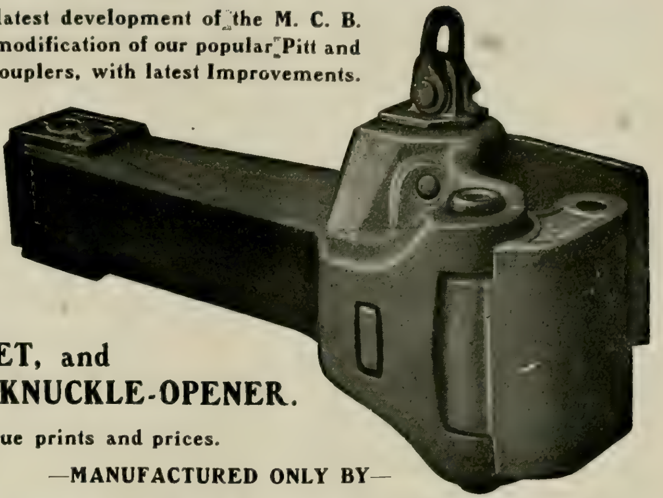

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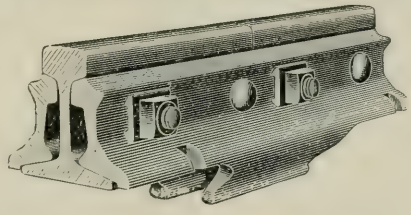

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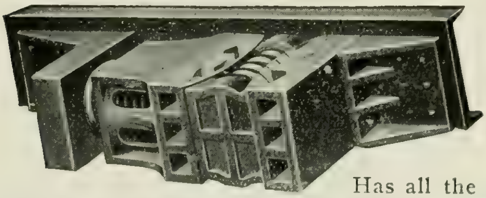

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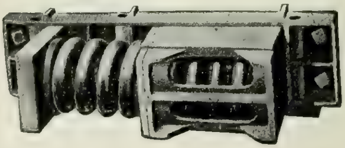

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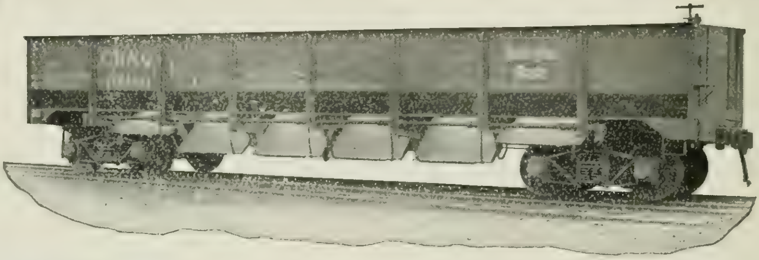

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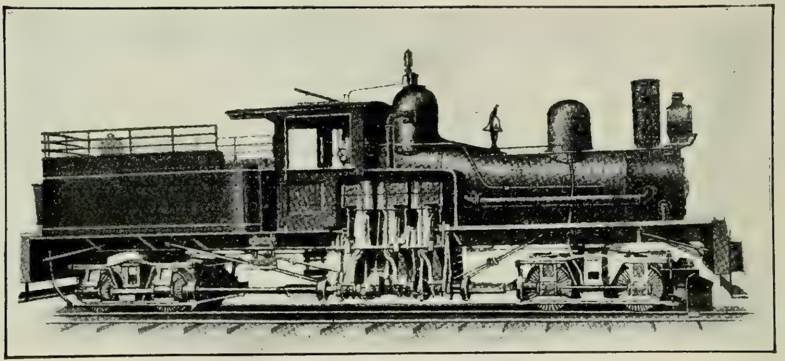

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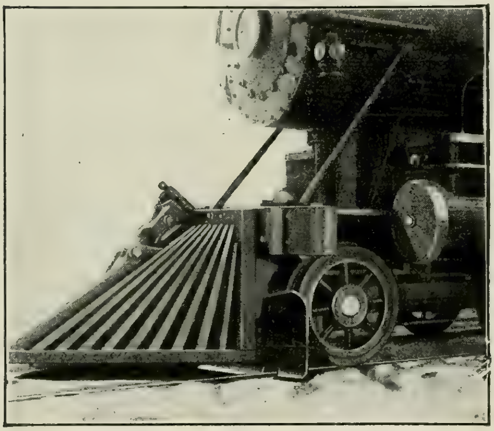

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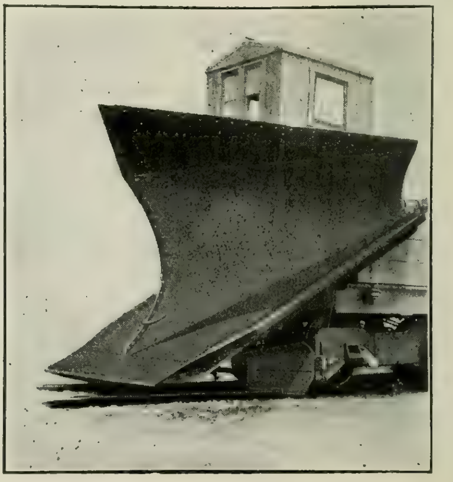

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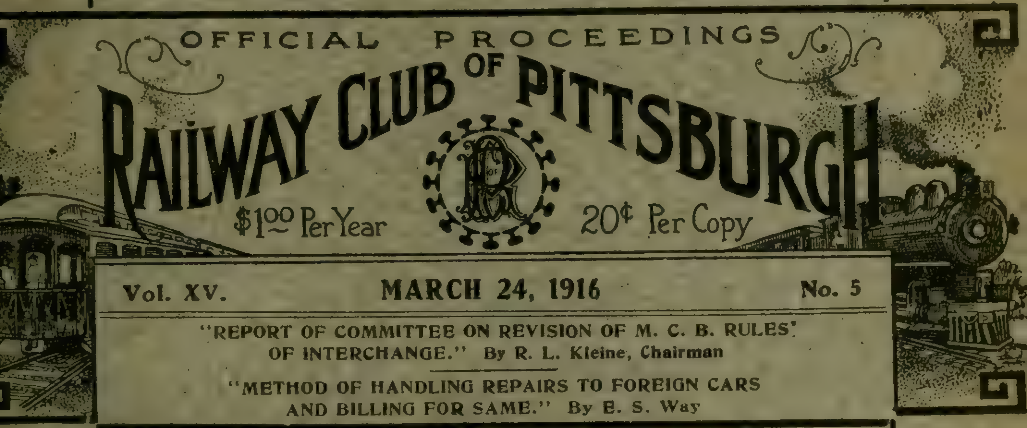

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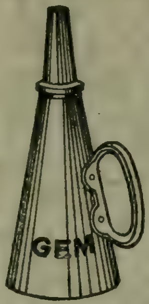

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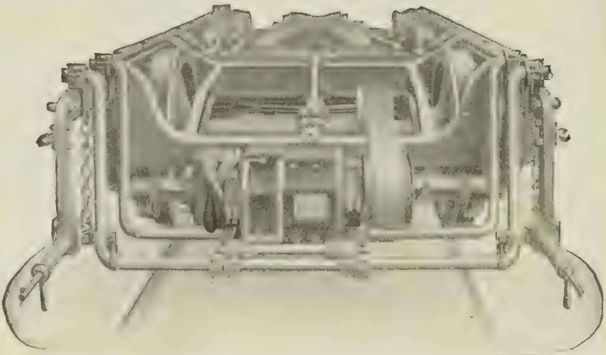

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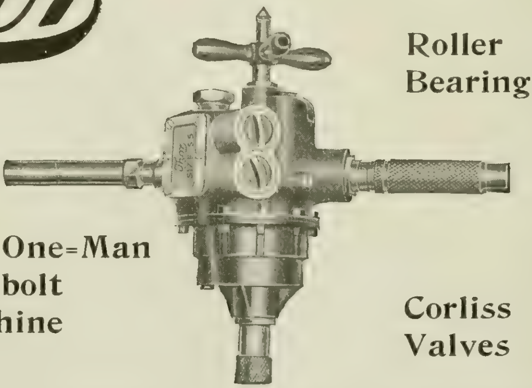

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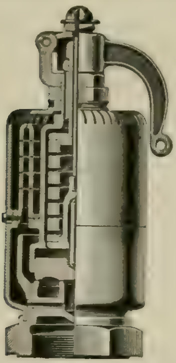

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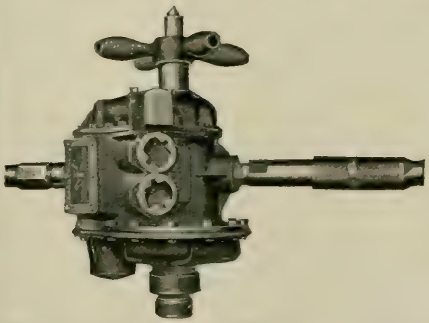

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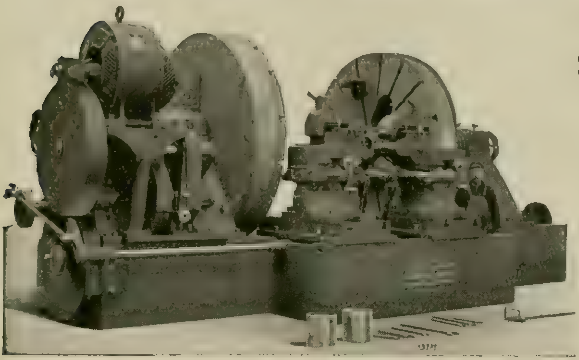

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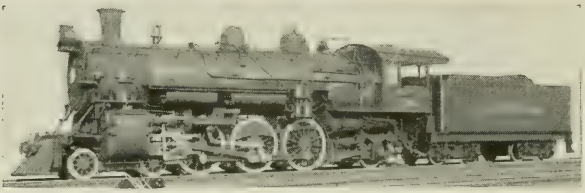

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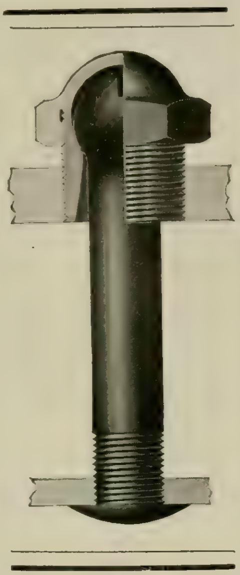

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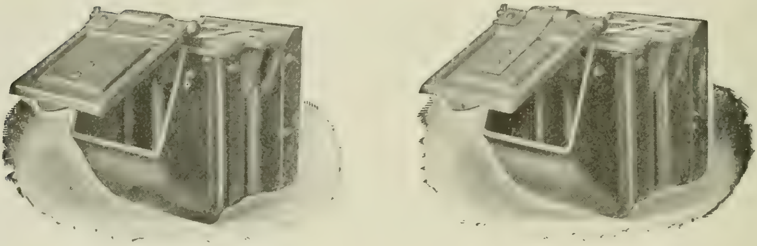

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OF
The Railway Club of Pittsburgh

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J. H. McCONNELL	October, 1901, to October, 1903.
L. H. TURNER	November, 1903, to October, 1905.
F. H. STARK	November, 1905, to October, 1907.
* H. W. WATTS	November, 1907, to April, 1908.
D. J. REDDING	November, 1908, to October, 1910.
F. R. McFEATTERS	November, 1910, to October, 1912.
A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING, MARCH 24, 1916.

The meeting was called to order at the Monongahela House, Pittsburgh, at 8 o'clock, P. M., with President F. M. McNulty in the chair.

The following gentlemen registered:

MEMBERS.

Anderson, A. E.
Anderson, J. B.
Babcock, F. H.
Barth, J. W.
Bauer, A. C.
Bell, R. P.
Blackall, R. H.
Boyer, Chas. E.
Brownscomb, G. J.
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Cooper, F. E.
Courson, J. F.
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Cunningham, R. I.
Dambach, C. O.
DeArment, J. H.
Dickinson, F. W.
Elk, G. R.
Francis, W. S.
Gale, C. H.
Grewe, H. F.
Grosse, C. H.
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Hague, J. R.
Hammond, H. S.
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Henry, J. M.
Hink, G. L.
Howe, H.
Hunter, J. A.
Jenney, J.
Johnson, I. S.
Johnson, W. A.
Johnson, W. M. Jr.
Kelly, H. B.
Kinch, L. E.
Kinter, D. H.
Kleine, R. L.
Klein, R. A.
Knickerbocker, A. C.
Laughner, C. L.
Lehr, H. W.
Lindner, W. C.
Lindstrom, C. A.
Llewelyn, W. R.
Loughridge, H. W.
Lowe, W. D.
Lynn, Saml.
McFeatters, F. R.
McNulty, F. M.
McVicar, G. E.
Matchett, H. K.
Maxfield, H. H.
Miller, W.
Murphy, P. F.
Neff, J. P.
Orchard, Chas.
Pennepacker, N. W.
Pie, J. J.
Proven, John
Richardson, L.
Ridley, R. C.
Rupprecht, K. J.
Ryan, W. F.
Schaff, A. J.
Schaich, W. L.
Schultz, G. H.
Slutzker, Jos.
Smith, E. M.
Smith, J. H.
Snyder, C. H.
Snyder, J. W.
Stucki, A.

Swann, J. R.
Taylor, F. C.
Turner, L. H.
Turner, W. V.
Watkins, G. H.
Way, E. S.
Wegener, H.
Wilson, T. A.
Wyke, J. W.

VISITORS.

Andrews, A. H.
Bauer, Carl
Bayer, G. J.
Bischoff, E. A.
Blake, F. H.
Boring, T. J.
Brutweiser, A.
Burgess, T. S.
Donaldson, H. C.
Emmons, G. C.
Flynn, R.
Harrod, C. L.
Hein, C.
Hunter, D. C.
Jacob, F.
Johns, A.
Kavanaugh, R. D.
Kleine, H. J.
Louder, J. M.
Long, J. H.
McConn, G. E.
McCurdy, R. M.
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Rieff, J. E.
Parfitt, H. J.
Parry, F. C.
Pfeiffer, C. A.
Pickels, H. D.
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Slicks, G. H.
Smith, A. E.
Stattler, H. A.
Thorn, Wm.
Walker, S.
Walther, C. W.
Wert, J. S.
Wertman, Geo.
Wheeler, R.
Williams, W. W.
Wray, R. W.
Wright, J. B.
Yergy, J. P.
Zinke, F. J.

The reading of the minutes was dispensed with the same being in the hands of the printer.

The Secretary read the following applications for membership:

Bayer, George F., Gang Leader, Pennsylvania R. R., Pittsburgh Road, West Brownsville, Pa. Recommended by D. H. Kinter.

Bischoff, E. H., Car Inspector, Pennsylvania R. R., P. O. Box 23, West Brownsville, Pa. Recommended by D. H. Kinter.

Emmons, G. C., Sales Engineer, Chicago Pneumatic Tool Co., 10-12 Wood Street, Pittsburgh, Pa. Recommended by W. T. Francis.

Goldfinch, R., Inspector, Pittsburgh Testing Laboratory, 815 Russellwood Avenue, McKees Rocks, Pa. Recommended by A. A. Mackert.

Gray, Thos. H., Conductor, Pennsylvania R. R., 352 College Avenue, Oakmont, Pa. Recommended by R. A. Klein.

Hackenberg, J. O., Supervisor, Pennsylvania R. R., Pennsylvania Station, Pittsburgh, Pa. Recommended by J. B. Anderson.

Hicks, George H., Machinist Foreman, Simplex Air Brake Co., 1807 Irwin Avenue, N. S., Pittsburgh, Pa. Recommended by D. C. Courtney.

Jungbluth, A., Steam Engineer, Vilsack-Lawd Co., 752 Portland Place, E. E., Pittsburgh, Pa. Recommended by W. H. Ritts.

Kelley, H. D., Representative Goldschmidt Thermit Co., 90 West Street, New York, N. Y. Recommended by J. B. Anderson.

Murray, L. C., Representative L. C. Murray Co., 807 First National Bank Building, Pittsburgh, Pa. Recommended by D. H. Amsbary.

Nelson, C. A., Draftsman, Westinghouse Air Brake Company, Wilmerding, Pa. Recommended by R. N. Lawley.

Ruff, J. E., Foreman Car Repairs, Pennsylvania R. R., West Brownsville, Pa. Recommended by D. H. Kinter.

Shaw, George C., Gang Leader, Pennsylvania R. R., West Brownsville, Pa. Recommended by D. H. Kinter.

Thomas, Frank B., Assistant Chief Draftsman, W. A. B. Co., 738 Kelly Avenue, Wilkinsburg, Pa. Recommended by P. L. Lobez.

Watson, H. C., Tool Designer, Westinghouse Air Brake Co., Wilmerding, Pa. Recommended by A. A. Mackert.

Wheeler, R., Car Inspector, Pennsylvania R. R., West Brownsville, Pa. Recommended by D. H. Kinter.

PRESIDENT McNULTY: As soon as these names have been approved by the Executive Committee, and upon payment of dues by the gentlemen they will become members of the Club without further action.

The Secretary announced the death, on December 13, 1915, of Harry H. Hunt, Engineman, Winfield Railroad, who joined the Club in September, 1913.

PRESIDENT: A suitable memorial will appear in the next issue of the Proceedings.

Is there any other business, if not we now come to the "Report of the Standing Committee on M. C. B. Rules of Interchange," which will be presented by Mr. R. L. Kleine, Chairman.

ANNUAL REPORT OF STANDING COMMITTEE ON REVISION OF M. C. B. RULES OF INTERCHANGE.

To the Officers and Members of
The Railway Club of Pittsburgh.

GENTLEMEN:

Your Standing Committee on the Revision of the M. C. B. Rules of Interchange, held a meeting at the Monongahela House, Pittsburgh, February 25th and 26th, to consider all the changes recommended by the Members of the Club, as the result of which we respectfully submit the following report:

We desire to make special mention of the recommendations covering axle requirements. After last year's convention, the Arbitration Committee revised Rule No. 86, covering the axle limits, eliminating therefrom the limits for cars marked with capacity, as well as Table No. 1 for tank cars marked "Limit Weight I," the idea being the universal use of M. C. B. Standard axles and to remove from interchange service any axles not conforming to M. C. B. Standards. Other changes were made in the various rules relating to these axle requirements, which placed the rules in such shape that they could not be followed. Furthermore, an insufficient length of time was given to the railroads and individual car owners, having these non-M. C. B. Standard axles under their cars, to conform to the new rules laid down. After this was brought to the attention of the Arbitration Committee, they issued Circular No. 6, reinstating certain non-M. C. B. Standard axles, which formerly appeared under the capacity markings, and changed certain rules relating to the axle requirements. Even with this change, the axle requirements are unsatisfactory and cannot be properly lived up to. Your Committee, therefore, took in hand the entire subject, revised all the rules relating to the axle requirements, and formulated a plan to retire the non-M. C. B. Standard axles and give the car owner sufficient length of time in which to comply with the rules.

Rules Nos. 58 and 59, covering the responsibility for air brake repairs do not cover the air brake work properly. These rules were consistent at the time they were first placed into effect, inasmuch as the air brake equipment on the cars generally was new. Deterioration has taken place, particularly in the piping and other details, and will continue to become defective, due to age and corrosion, as well as ordinary service conditions. In order that the air brake may be properly maintained on the cars, it is but right and proper that the car owner be chargeable for wornout parts, to be consistent with the other parts of the car, and with this idea in view, Rules Nos. 58 and 59 have been revised.

The air brake prices have been revamped on a basis of actual cost. Originally the air brake prices were made up on a basis of certain unit prices, but as these unit prices are not used in charges, but were simply inserted to show how these prices were determined, the unit prices should be dropped from the rules. The present bulk prices do not, in many cases, cover all of the detail work necessary to be performed in order to properly take care of the job. The rules, as revised, cover the matter up to date.

The remaining recommendations are largely made with a view of clarifying the rules, as well as to eliminate any misunderstandings between roads as to charges for certain items of work.

Your Committee desires to direct the attention of the Members to M. C. B. Circular No. 17, dated February 7th, issued by the Executive Committee, covering modification of Tank Car Specifications; also, to the Order of the Interstate Commerce Commission, Docket No. 3666, issued January 20, 1916 (which is quoted in M. C. B. Circular No. 17), covering modification in the Tank Car Specifications relative to setting of the safety valves at 25 pounds pressure and the automatic venting of pressure on all tank cars containing shipments of inflammable liquids with a flash point lower than 20° F. This requirement is effective March 15th, and it is essential for all roads to adopt such measures that these requirements are understood by all tank car shippers and railroad inspectors.

We also call attention to M. C. B. Circular No. 20, dated February 15th, from the Executive Committee, on the subject of safety appliances, in which it is stated that the Arbitration Committee will propse an addition to Rule No. 3, as follows:

> 1. Six months prior to July 1, 1917, no car will be received from owner unless properly equipped with United States Safety Appliances or United States Safety Appliances, Standard.
>
> 2. Three months prior to July 1, 1917, no car will be accepted in interchange unless properly equipped with United States Safety Appliances or United States Safety Appliances, Standard.

There are still a large number of cars to be equipped with safety appliances and the roads will be taxed to the limit of their facilities to change all their cars by July 1, 1917, when all cars moving in interstate traffic must conform to the law.

The provision of six months prior to July 1, 1917, when no car will be received from owner unless properly equipped with United States Safety Appliances or United States Safety Appliances, Standard, will restrict the movement of such cars to the extent of seriously interfering with transportation, and it is the thought of your Committee that this item should be reduced to three months and an understanding had with the American Railway Association that after that period all foreign cars not equipped with safety appliances should be moved to the home road.

Regarding the second requirement; cars not equipped with safety appliances to conform to the Law should be allowed to be interchanged until the date the Law goes into effect, or until July 1, 1917. Unless this is permitted, it will work a serious hardship on the Transportation Department, and will necessitate the equipping of cars with safety appliances on foreign roads, which is not desired, as it is difficult, if not impracticable, for foreign roads to equip an owner's car according to the standards laid down by that owner.

Your Committee is indebted to the Club for the facilities and entertainment provided during their consideration of these rules.

Respectfully submitted,

C. E. BOYER,
Pennsylvania Railroad, Lines East of Pgh.

G. E. CARSON,
New York Central Railroad, East of Buffalo.

S. H. CROMWELL,
Baltimore & Ohio Railroad.

A. F. COULTER,
Union Railroad.

F. W. DICKINSON,
Bessemer & Lake Erie Railroad.

H. F. GREWE,
Wabash Pittsburgh Terminal.

W. J. KNOX,
B. R. & P. Railroad

S. LYNN,
Pittsburgh & Lake Erie Railroad.

J. B. SWANN,
P. C. C. & St. Louis Railway.

F. H. STARK,
Montour Railroad.

R. L. KLEINE, *Chairman,*
Pennsylvania Railroad, Lines East of Pgh.

RECOMMENDED CHANGES IN THE 1915 CODE M. C. B. RULES OF INTERCHANGE.

Revision of M. C. B. Rules Covering Axle Requirements. (The rules relating to axles have been grouped together for ready reference in considering this subject).

RULE 3, Section (d):

Paragraph 1. No change.

Paragraph 2. Change to read "Cars built prior to October 1, 1915, with axles other than M. C. B. Standard, will not be accepted in interchange after October 1, 1920."

> Explanation: On account of the large number of odd axles, as well as M. C. B. Standard lengths of axles with limits below those previously in force under "Maximum Weight," or in other words, with limits conforming to "Capacity" in the 1914 Rules, it is a physical impossibility to change these axles to conform to M. C. B. Standard axles by October 1, 1917. In the case of non-M. C. B. Standard lengths of axles, it involves rebuilding of the truck. This is aside from the enormous expense involved and is not justifiable. Furthermore, a large number of these cars will be retired on account of obsolescense within the next few years. By giving a reasonable fixed time in which all axles on cars in interchange must conform to M. C. B. Standard axles, permits the railroads to make proper arrangements for either rebuilding the trucks or retire the cars, as may be consistent with their policy.

Paragraph 3. Change to read "M. C. B. Standard axle must be used in repairing or replacing an M. C. B. Standard axle. Between October 1, 1916, and October 1, 1920, in repairing foreign cars, non-M. C. B. Standard axles may be used to replace non-M. C. B. Standard axles in kind, but M. C. B. Standard axles should be used to replace non-M. C. B. Standard axles when axle length conforms to M. C. B. Standard length."

> Explanation: The non-M. C. B. Standard axle is

primarily an owners' proposition. The present rule is impracticable inasmuch as a foreign road cannot apply an M. C. B. Standard axle in repairs where the lengths of axles differ without rebuilding the truck. The remainder of the rule has been revised to provide for the application of M. C. B. Standard axles for non-M. C. B. Standard axles where the length of the axle will permit.

Paragraph 4. Change to read "Cars built after October 1, 1916, with journal bearings other than M. C. B. Standard, will not be accepted in interchange. After October 1, 1920, all cars must be equipped with standard M. C. B. journal bearings to be acceptable in interchange."

Explanation: To enforce the use of the standard journal bearings when all axles have been changed to conform to M. C. B. Standards.

RULE 9, "Wheels and Axles, R. & R."

Add the following to the details now enclosed by the bracket: "M. C. B. or Non-M. C. B., length of axle, diameter and length of journal, diameter of wheel fit, diameter of center of axle. (Only one dimension for length of journal, diameter of journal and diameter of wheel fit to be given, which shall be the dimension nearest the condemning limit.)"

Explanation: It is essential to show the additonal information recommended to be inserted in Rule No. 9, so as to determine whether the rules have been complied with in the changing of the axle; and further, to provide the necessary data to prepare charges.

RULE 27, Eliminate.

Explanation: The present rule is along the right line, but cannot be carried out, as no provision is made in the rules for showing the size of wheel fit on axles removed or applied. The proposed revision covers the matter fully in Rule No. 9, "Revision of Billing and Record Repair Cards, (Wheels and Axles)" and Rule No. 98, "Revision of Prices Based on Difference in Journal and Wheel Fit Dimensions."

RULE 29, Omit the word "second-hand" from this rule.

Explanation: The values of axles given in Rule No. 98 determine whether the axle is new, second-hand or scrap.

RULE 86, change as follows:

Each car must have its capacity and lightweight in pounds stencilled on it, as per paragraph (j), Rule 3.

For Cars With Non-M. C. B. Standard Axles. (Four Axles Per Car).

Non-M. C. B. Standard axles less than the following prescribed limits must be removed from service:

Capacity	Journal	Wheel Seat	Axle Center
80,000 lbs.	4½ in.	6¼ in.	5 5/16 in.
70,000 lbs.	4 in.	5⅝ in.	4⅞ in.
60,000 lbs.	3¾ in.	5 in.	4⅜ in.
50,000 lbs.	3½ in.	4¾ in.	4⅛ in.
40,000 lbs.	3¼ in.	4⅝ in.	3⅞ in.

For Cars With M. C. B. Standard Axles. (Four Axles per Car).

The total weight of car and its lading must not exceed weight given in column "A." Column "B" is the nominal capacity stencilled on all cars. Axles must be removed from service when less than the prescribed limits in columns "C," "D" and "E."

Owners' Responsible Column "A"	Column "B" Nominal Capacity	Column "C" Journal	Column "D" Wheel Seat	Column "E" Axle Center
210,000 lbs.	140,000 lbs.	5½ in.	7⅜ in.	6 7/16 in.
161,000 lbs.	100,000 lbs.	5 in.	6¾ in.	5⅞ in.
132,000 lbs.	80,000 lbs.	4½ in.	6¼ in.	5⅜ in.
95,000 lbs.	60,000 lbs.	3¾ in.	5½ in.	4¾ in.
66,000 lbs.	40,000 lbs.	3¼ in.	4⅞ in.	4¼ in.

Note: Axles heretofore known as 70,000 pound and 50,000 pound capacity axles are not M. C. B. Standard axles.

Explanation: Rule No. 86 has been revised as above, to separate the M. C. B. Standard axles from the Non-M. C. B. Standard axles. The 50,000 pound and 70,000 pound axles shown in Rule No. 86 of the 1915 Rules of Interchange among the M. C. B. Standard axles have never been a standard of the Association and there are no drawings of the same. It is not desired to perpetuate these axles, as they are only intermediate axles between the 40,000 pound and 60,000 pound capacity M. C. B. Standard axles and between 60,000 pound and 80,000 pound capacity M. C. B. Standard axles.

RULE 87.

Change last two lines to read "ciled showing capacity and lightweight in pounds."

Explanation: Limit weight has been superseded by capacity markings according to instructions from the American Railway Association.

RULE 98, page 112:

Change material prices for axles as follows:

M. C. B. STANDARD AXLES.

Size	Kind	Journal		Wheel Fit	Price
		Length Min. In.	Diameter Min. In.	Diameter Min. In.	
One 140,000 lb. Axle.	New	11	6	7⅝	$25.50
	Secondhand	11⅛	5⅞	7 9/16	20.25
	Secondhand	11¼	5¾	7½	15.00
	Secondhand	11⅜	5⅝	7 7/16	9.75
	Scrap	11½	5½	7⅜	4.50
One 100,000 lb. Axle.	New	10	5½	7	19.50
	Secondhand	10⅛	5⅜	6 15/16	15.55
	Secondhand	10¼	5¼	6⅞	11.60
	Secondhand	10⅜	5⅛	6 13/16	7.65
	Scrap	10½	5	6¾	3.70
One 80,000 lb. Axle.	New	9	5	6½	16.50
	Secondhand	9⅛	4⅞	6 7/16	13.13
	Secondhand	9¼	4¾	6⅜	9.75
	Secondhand	9⅜	4⅝	6 5/16	6.38
	Scrap	9½	4½	6¼	3.00
One 60,000 lb. Axle.	New	8	4¼	5¾	13.00
	Secondhand	8⅛	4⅛	5 11/16	10.25
	Secondhand	8¼	4	5⅝	7.50
	Secondhand	8⅜	3⅞	5 9/16	4.75
	Scrap	8½	3¾	5½	2.00
One 40,000 lb. Axle.	New	7	3¾	5⅛	10.00
	Secondhand	7⅛	3⅝	5 1/16	7.91
	Secondhand	7¼	3½	5	5.83
	Secondhand	7⅜	3⅜	4 15/16	3.74
	Scrap	7½	3¼	4⅞	1.65

Note: (1) The dimension nearest the condemning limit in journal length, journal diameter or wheel fit diameter, will govern the price to be credited and charged for the axle removed and applied. Example: 100,000 pound axle, journal length 10⅛ inches, journal diameter 5¼, inches, wheel fit 6-13/16 inches. The wheel fit is nearest the condemning limit, and therefore this dimension governs the price, or $7.65.

(2) Where the actual dimension is between two given dimensions in price list, the lower price must be taken. Example: 100,000 pound axle, actual journal length 10-3/16 inches. The journal length of 10¼ inches governs, corresponding to the price of $11.60.

NON-M. C. B. STANDARD AXLES.

	Scrap
One axle, 70,000 lb	$ 2.50
One axle, 60,000 lb.	2.00
One axle, 50,000 lb. or under	1.65

Explanation: M. C. B. Standard axles should be charged and credited on a basis of the amount of wear (or life) in the axle. At present, practically a new axle may be removed and an axle with limits slightly above condemning limits can be applied at the same material charge. The axle is equally as important as the steel wheel and the variation per 1/16 or ⅛ inch wearing metal considerably higher. A table of values is, therefore, recommended for M. C. B. Standard axles based on the wear of the axles; and the Non-M. C. B. Standard axle is considered scrap, irrespective of its condition, as it is desired to remove these latter axles from service as rapidly as possible.

RULE 98.

Paragraph 1, top of page 118, change to read "The necessary information must be given in all cases, as provided for in Rules 9 and 10."

Explanation: Certain information must be given on wheels and axles as provided for in Rule No. 9; therefore, the above paragraph should make reference to it.

RULE 99.

Change to read "If car owner elects, on account of improper repairs, to remove an M. C. B. Standard axle unsuitable to the car and apply a Non-M. C. B. Standard axle between the dates of October 1, 1916, and October 1, 1920, he shall charge scrap price for the Non-M. C. B. Standard axle applied and give credit for value of M. C. B. Standard axle removed, according to prices given in Rule 98."

> Explanation: As the rule now stands, it penalizes the party applying an M. C. B. Standard axle and directly benefits the owner who is the user of the Non-M. C. B. Standard axle. This should be reversed to enforce the the use of M. C. B. Standard axles.

Paragraph 2, change to read "In removing and applying axles, the credit and charge for the material shall be on the basis of the values provided in Rule 98. When collars are worn to less than 5/16 inch, the axle shall be considered as scrap."

Explanation: To conform to change in Rule No. 98.

Pages 230 and 231: Illustrations of Billing Repair Card (Wheels and Axles) to be revised as per following illustration.

M. C. B. ASSOCIATION—BILLING REPAIR CARD—(Wheels and Axles)

(Name of Railroad)

WHEELS AND AXLE REMOVED						WHEELS AND AXLE APPLIED					
MAKER	Ry. Co's Initials on Wheel	WHEEL NO. DATE CAST	Service Metal		CAUSE OF REMOVAL	MAKER	Ry. Co's Initials on Wheel	WHEEL NO. DATE CAST	Service Metal	New or Sec. Hand	Net Charge
			Before Turning	After Turning							
AXLE M. C. B. / NON M. C. B.	……… LENGTH ……… CONDITION OF					AXLE M. C. B. / NON M. C. B.	…………… LENGTH ……… ……				

LOCATION	SIZE AND KIND OF WHEELS	ACTUAL DIMENSION	JOURNAL		WHEEL SEAT	CENTER	LABOR	
			LENGTH	DIAM.	DIAMETER	DIAMETER		
	REMOVED ………………………………	REMOVED					TOTAL	
	APPLIED ……… ……… ………………	APPLIED						

TO BE ATTACHED TO BILL

DATE…………………………………………191…… REPAIRED AT ……………………………………………………………………… INSPECTOR……… ……………… ………………………

CAR NO.……………………………………… INITIAL OR NAME………………………………………………………………………………………… KIND …………………………… ………………………

Explanation: To conform to the recommendations for change relative to axle requirements.

RULE 2.

Paragraph (e), change to read "When cars cannot pass the clearances of American Railway Association."

Explanation: To conform to Car Service Rule No. 15, as amended November 17, 1915.

Section (f), first paragraph: After the last word, change colon to comma, and add "by receiving line."

Explanation: This is covered by Circular No. 6, "Interpretations of the Rules of Interchange," but should be covered explicitly in this rule.

Section (f), fifth paragraph, change to read "*Defective draft timbers, draft timber bolts,* body center plate or body center plate bolts on all cars, except where such center plate is cast integral with bolster on foreign cars."

Explanation: To avoid the unnecessary transferring of lading, as draft timbers and draft timber bolts can, in the majority of cases, be applied to cars under load. It is no more difficult to apply draft timber bolts, than it is center plate bolts that extend through the floor of the car.

Interpretation of, on page 7: Change date in first line, on page 7, to read "July 1, 1917."

Explanation: To conform to the extension of time granted the railroads by the Interstate Commerce Commission for the standardizing of safety appliances.

Section (f), last paragraph, page 8: After the word "pass" in fifth line, add the word "the," and eliminate the words "third rail" in sixth line.

Explanation: To conform with recommended change in Rule 2, paragraph (e).

RULE 3.

Section (c), change to read:

"Cars will not be accepted in interchange unless equipped with all-metal brake beams.

"Cars built after October 1, 1914, and prior to January 1, 1917, will not be accepted in interchange unless equipped with No. 1, No. 2 or No. 3, M. C. B. Standard brake beams.

"Cars built after January 1, 1917, must be equipped with either No. 2 or No. 3 M. C. B. Standard brake beams.

"All of the brake beams referred to shall have the letters 'M. C. B.' and the number plainly stamped or cast on strut, as required by the specifications."

> Explanation: The above recommendation conforms to the intent of the recommendation submitted to Members of the Association by the Committee on Brake Shoe and Brake Beam Equipment, in Circular No. 15, but the wording has been changed to cover the present requirements of sections (c) and (h) of Rule 3.
>
> It is felt desirable to eliminate section (h) and include same in section (c), in order to place all brake beam reference in one paragraph.
>
> The above recommendation also provides for the use of No. 3 M. C. B. Standard brake beams which are now being used by certain roads.

Section (e), change to read "Tank cars (empty or loaded) will not be accepted in interchange unless they comply with M. C. B. Tank Car Specifications."

> Explanation: The Tank Car Specifications are now a standard of the Association, and the Preface to the Rules of Interchange provides that the inspection of tank cars must be in accordance with the Specifications for Tank Cars; therefore, the above rule should cover the entire Specifications for Tank Cars instead of specified details of same.

Section (g), change date to read "October 1, 1917."

> Explanation: In order to provide more time to permit the railroads to complete the work of stenciling the date built on their equipment.

Section (h), omit reference to date and include section (h) as a part of section (c).

> Explanation: Reference to date is unnecessary, as

present section (h) will become effective on October 1, 1916, and by including same in section (c) it will place all brake beam reference in one paragraph.

Section (i), omit reference to date.

Explanation: This rule becomes effective October 1, 1916.

Section (k), change to read "After October 1, 1917, all cars of less than 60,000 pound capacity, having wooden or metal draft arms which do not extend beyond the body bolster, will not be accepted in interchange."

Explanation: Year changed from 1916 to 1917, on account of the large number of refrigerator cars stencilled 50,000 pounds capacity being still in service.

RULE 4.

Paragraph 3, insert period after word "inspector" in sixth line, and eliminate remainder of paragraph.

Explanation: The present reference to car owner and receiving line is unnecessary, as it is understood that the Chief Interchange Inspector represents both the delivering and receiving line.

Last paragraph, omit reference to Rule 56.

Explanation: Cars equipped with wooden brake beams will not be accepted in interchange after October 1, 1916.

RULE 9.

Page 18, add the words "Box Numbers (See Rule 14)" in bracket opposite reference to "Wheels and axles, R. & R."

Explanation: It is important that the location of wheels applied be shown by box numbers, as per Rule 14, in order to show the exact location of the wheels and to enable car owner to check against the subsequent application of journal bearings.

Page 20, first paragraph in bracket, opposite reference to metal brake beams, change to read: "Make or name of beam. If M. C. B. Standard brake beam is applied, state whether No. 1, No. 2 or No. 3, in addition to name of beam."

Explanation: To provide for proper reference to No.

3 beam in accordance with recommendation in connection with Rule 3, paragraph (c).

Page 20, after the words "Triple valve R. & R." eliminate the fololwing note: "(Need not be shown when cleaned only)."

Explanation: The M. C. B. Association requirements provide that triple valves removed from foreign cars for cleaning or repairs must be tested on an approved test rack before being applied to the car, and as in the majority of cases the same valve is not reapplied to the car, it is felt that the make and type of valve removed and replaced should be shown in all cases. This information also will assist car owners in locating responsibility for wrong repairs.

Page 20, add a new marginal reference, together with additional items, in a bracket, as follows:

General	Weights of forgings, castings, etc. Feet of lumber. Value of miscellaneous items. Hours labor.

(The above information to be shown opposite each item).

Explanation: This will make it compulsory on the part of all roads to show this information on repair cards, whereas at the present time, some roads fail to show same on billing repair cards, making it very difficult to accurately check the bills. This will also greatly minimize correspondence.

RULE 13.

Add sentence: "It must be stated on back of joint evidence card where and when the wrong repairs were corrected."

Explanation: It is felt that the date repairs are actually corrected should in all cases be shown on joint evidence card to indicate that the requirements of Rule 13 have been complied with. The words "went forward without repairs" have been omitted from the card for the reason that when repairs are not made, the card is attached to the car, and therefore this wording serves no practical purpose.

RULE 14.

Following the first paragraph, the following addition:

"On cars having two brake cylinders but only one brake staff, the end of the car at which the brake staff is located shall be known as the 'B' end.

"On cars having two brake cylinders and a brake staff at each end, one end must be plainly stencilled with the letter 'B', and the opposite end stencilled with the letter 'A'."

Explanation: This additional requirement is necessary in order to properly designate the location of repairs on cars equipped with brakes as referred to.

Second pararaph, omit the word "the" after the word "car" in second line, and insert the word "wheels," followed by a comma. Also, insert a comma after the word "parts" in the third line.

Explanation: To conform to the recommendation in Rule 9, with reference to designating exact location of wheels removed and applied.

RULE 17.

Section (e), change to read: "After October 1, 1916, M. C. B. Standard No. 2 brake beams may be used in repairs to all freight equipment cars equipped with M. C. B. No. 2, M. C. B. No. 1, or Non-M. C. B. Standard beams. Any increased cost resulting from the application of No. 2 brake beams to be borne by the car owner when repairs are made on account of car owners' defects. M. C. B. Standard No. 3 brake beam must be replaced in kind."

Explanation: To make the use of M. C. B. Standard brake beams more general in repairs, and conform to the recommendation of the Committee on Brake Shoe and Brake Beam Equipment in Circular No. 15, except that provision has been made to protect the users of M. C. B. No. 3 brake beam.

Add new paragraph: "After October 1, 1920, all brake beams removed in repairs, other than those conforming to M. C. B. Standard, will be credited as scrap."

> Explanation: To conform to the intent of the recommendation of the Committee on Brake Shoe and Brake Beam Equipment, in Circular No. 15. The wording has, however, been changed, as it is felt that the specific reference to No. 2 brake beam as made by the Committee, is improper, for the reason that any good part or parts of brake beams which are a standard of the Association should not be credited as scrap when removed; and in order to bring about the elimination of the present No. 1 brake beam, which has become practically obsolete, except on older cars weighing 35,000 pounds or less.

Section (f), change the word "should" in first line to "must."

> Explanation: In order to make it imperative, since this information must be shown on billing repair cards.

Section (h), change last sentence to read "Fir, oak or southern pine may be substituted for each other in renewing or splicing of longitudinal sills and side plates. Oak and southern pine may be substituted for each other in renewing end plates. Fir and southern pine may be substituted for each other in renewing or splicing end plank and side plank."

> Explanation: It is felt that the use of fir, oak and southern pine, for the parts specified is not objectionable; and therefore, the modification of this rule as suggested will facilitate repairs by extending the use of the material referred to.

Section (i), change to read "Arch bars and brake shafts must not be welded."

> Explanation: On account of the uncertain results that are obtained by permitting the universal practice of welding arch bars, which practice is therefore dangerous, it is considered imperative from a safety standpoint, to prohibit the welding of arch bars. The reference to brake shafts in this paragraph is necessary on account of it being a safety appliance requirement. No mention should be made of sill steps, uncoupling levers and grab irons, as by doing so the practice of welding

on the center arm of double uncoupling levers and third leg of grab irons is misconstrued.

Section (j), add new paragraph: "Cotter keys are not to be applied to knuckle pins of couplers of cars other than hopper and fixed end gondolas."

Explanation: To take the place of interpretation on this subject, Rule 95, Circular No. 10, and which should be a part of the rules.

RULE 20.

Add a new paragraph after the first paragraph, as follows: "The use of liners between male and female portions of center plates is prohibited."

Explanation: The practice of placing liners between male and female portions of center plates should be prohibited, as the thickness of the liners cannot be controlled, and the engaging surfaces of flanges of center plates will be reduced, throwing undue strain on the same increasing breakage.

RULE 22.

Add to first sentence: "Except that draft timbers extending full length of car may be spliced at center or at both ends between the crosstie timbers and a point not less than 12-inch from body bolster."

Explanation: Certain cars are equipped with full length wooden draft timbers, and it is considered equally as practicable to splice these full length draft timbers as it is to splice longitudinal sills, and it is also economical to car owner.

Second paragraph, change "12-inch" in third line to "8-inch."

Explanation: By permitting sills to be spliced up to a point within not less than 8-inch of body bolster, will frequently enable the repairing line to splice sills in front of bolster that would have to be spliced back of bolster under the present limit; therefore, the proposed limit is recommended as a measure of economy.

RULE 36.

Sections 1 to 5, incl., revise as follows:

"1. ROUTING CARDS. — To be of cardboard; maximum size, vertical dimension, five inches; horizontal dimension, eight inches.

"To be permitted on all loaded cars.

"The text to be as follows: No picture or trade mark to be permitted. Space for railroad information to occupy lower three-fifths of card. Any printing on the upper two-fifths to be limited to letters not exceeding one-half inch in any dimension. All printing to be in black ink. Any deviation from the above will be considered as an advertisement, and cards should be removed and charges made in accordance with M. C. B. Rules 36 and 107.

"They may be affixed by shippers, not to exceed one card on each side of a car; must not be pasted or glued, but placed in rack or on specified location when such is provided for in local rules.

"(See page 233 for copy of card in reduced form).

"2. COMMODITY CARDS. — To be on cardboard; maximum size, vertical dimension, five inches, horizontal dimension, eight inches.

"To be permitted only on cars loaded with perishable or fragile freight.

"No picture or trade mark to be permitted. All printing to be in black ink, and show only the name of commodity. Any deviation from the above will be considered as an advertisement, and cards should be removed and charges made in accordance with M. C. B. Rules 36 and 107.

"They may be affixed by shippers, not to exceed one card on each side of a car; must not be pasted or glued, but placed in rack or on specified location when such is provided for in local rules.

"3. SPECIAL PLACARDS. — These shall be such as are required by the 'Interstate Commerce Commission Regulations for the Transportation of Explosives and other dangerous articles by freight and by express', and are to be of the size as therein described. They shall be used, be of the text and be attached to the cars, as prescribed by said regulations.

"4. SYMBOL AND M. C. B. CARDS. — These are prescribed by individual roads for special purposes. Their size, use, text and method of application will be prescribed by each individual road to suit its requirements.

"5. SPECIAL CARDS REQUIRED BY THE FEDERAL OR STATE GOVERNMENTS. — Customs Regulation Card printed on red cardboard, eight inches by ten and one-half inches in size, which specifies the penalty for the unlawful removal of the United States Customs Seals, and will be used as prescribed by the United States Customs Regulations.

"(See page 233 for copy of card in reduced form).

"Other cards required by the laws of the United States, and within some of the States.

"Agents will see that routing cards used by shippers conform to the required specifications.

"Note: The above does not apply to advertisements on the lading of 'open cars'."

Explanation: To conform to resolution adopted by the American Railway Association, November 17, 1915.

RULE 42.

Eliminate this rule.

Explanation: Where the end posts are of proper construction, no trouble is experienced from breakage due to load shifting. In the older design of cars, where light end posts with short tenons are in use or decay has set in, all four end posts are frequently broken, or are in such defective condition that they should be renewed in order to make permanent repairs. Therefore, such renewals should be charged to car owner.

RULE 57.

Third paragraph: Omit reference to date in first line.

Explanation: As this rule has been effective since October 1, 1914, the reference to date is unnecessary.

Page 74. Illustration of air brake hose: Change the dimensions showing location of label to read "5½ inch to 6½ inch."

Explanation: To conform to M. C. B. Specification.

RULE 58.

Change to read: "Air hose when missing complete, missing cylinders, reservoirs, triple valves, angle cocks, cutout cocks, dirt collectors, pressure retaining valves, release valves, pipe or pipe fittings; also damage to any of these parts when such damage is due to wreck, derailment, cornering or sidewiping."

Explanation: It is felt that the present rule is too drastic and works a hardship on the repairing line, for the reason that numerous cases are found where reservoirs are failing in fair service; also, the lugs on reservoirs and cylinders become broken in fair service. Further, in a great many instances, triple valves are found with the threaded portion at exhaust port, as well as the threaded portion of check valve case cracked or broken, which condition develops in ordinary service; and on account of these defects being difficult to protect at interchange, the repairing line is penalized when the defects are found on repair tracks. Likewise, numerous cases are found where pipe and pipe fittings are cracked or broken, although there is no evidence of unfair usage; and it is felt that the car owner should assume responsibility for these repairs.

RULE 59.

Change to read: "Renewal or repairs to any part of the air brakes, including leaky pipe or pipe fittings (except tightening unions) unless due to wreck, derailment, cornering or sidewiping, except as provided for in Rule 58."

Note: If the above recommendations for Rules 58 and 59 are approved, all of the interpretations on pages 77, 79 and 81, with reference to rules 58 and 59, should be eliminated with the exception of the interpretation on page 77 with reference to missing dirt collector.

Explanation: The modification of this rule is made to conform to recommendations on Rule 58, and with the further thought of making the car owner responsible for removing and replacing air brake pipe and fittings, in order to tighten leaky joints, with of course the exception of pipe unions, the tightening of which is considered as a detail of inspection, as provided for in Rule 108. A number of roads follow the practice of making a soap-suds test on pipe and pipe fittings, and where this practice obtains, numerous leaks are found in the piping which, beyond any doubt, develop in ordinary service; and it is felt that the repairing line should be reimbursed for this work. The adoption of the recommendations as herewith submitted for Rules 58 and 59 will result in better maintenance of air brake equipment on foreign cars by the handling lines.

RULE 60.

Second paragraph, change to read "Triple valves cleaned must be removed from car and tested in accordance with the M. C. B. Code of Tests for repaired triple valves."

Explanation: In order to clearly indicate that triple valves must not be cleaned on cars.

Add new paragraph, as follows: "When cylinder is cleaned, the weighted valve in retaining valve must also be cleaned."

Explanation: To insure proper maintenance of retaining valve.

RULE 65.

Change to read as indicated, and then drop interpretation on Rule 65 in Circular No. 6: "Journal bearings, (regardless of previous condition) journal box bolts *and dust guards,* which require renewal when delivering company is responsible for change in wheels and axles."

Explanation: To conform to the interpretation of this rule as shown in Circular No. 6.

RULE 84.

Add a comma after the word "bent" in first line.

Explanation: To clarify the rule and indicate that axles cannot be bent in fair service.

RULE 91.

Add new paragraph, as follows:

"(f) Billing repair cards returned for correction or on account of exceptions must not be defaced in any manner on the face of the card."

Explanation: The practice now followed by a number of roads of writing their exceptions to a charge on face of billing repair cards is very objectionable, as it defaces the card and frequently makes it difficult to determine the original wording, making it necessary to consult original record.

RULE 94.

Second paragraph, change to read: "If the owner elects to dismantle the body or trucks, or both, charge may be made for such material as would be required for the repairs covered by the defect card, but *such charge to be confined to the actual material stated on card.* No labor shall be charged in such case, except insofar as labor is already included in M. C. B. Prices for material."

Explanation: To conform to the interpretation placed on this rule in Circular No. 10.

RULE 95.

Fifth paragraph to be advanced to the fourth paragraph, and the latter to be made the fifth paragraph. Change present fifth paragraph to read as follows: "Couplers, including yokes, springs, friction draft gears complete, and pressed steel bottom follower guides, or friction draft gears complete whether or not lost with the coupler."

Explanation: Friction draft gears are very expensive, and under the present rule if same are lost separately, the car owner is charged for labor and also for a complete new gear, scrap credit being allowed for the missing gear. As these gears are usually reclaimed in good condition, it is unjust to car owner to only allow scrap credit for such gear. Furthermore, friction draft gears are far more expensive than brake levers, lever guides, etc., and it is therefore inconsistent to permit a material charge for friction draft gear when lost separately, and only permit a labor charge for such items as brake levers, lever guides, etc., when lost separately. It is considered desirable to advance the present fifth paragraph to the fourth paragraph, in order to place it with other paragraphs covering repairs for which labor only can be charged.

RULE 101.

It is recommended that each item of material in Rule 101 be numbered, for convenience in referring to certain items of material in correspondence.

Page 122, insert new item:

	8 in.	10 in.
"Triple cylinder bushing renewed, including renewal of piston ring, net, applied............	$1.59	$1.59

Explanation: This item of repairs is not properly covered in the present rules, for the reason that there is no allowance covering the value of the material in a new bushing. The item shown in Rule 111, "Triple cylinder bushing, reground or refitted....$1.12." is used to cover the labor only for renewing and refitting a bushing; but it is felt that this price is excessive for the labor operation only, and as the application of new bushings is usually performed by the manufacturer, which operation also requires the renewal of the piston ring, and as triple valves sent to the manufacturer usually received other repairs that would not ordinarily be made by the railroads, it is felt that the net price including both labor and material for renewing a triple cylinder bushing and piston ring is very desirable and equitable. The recommended price of $1.59 is made up of the present prices of $1.12 for triple cylinder bushing, reground or refitted, and $0.25 material, and $0.22 labor for piston ring.

RULE 102.

Add additional paragraph, as follows: "In computing charges for bolts, nuts and forgings, if fractional weight of each entry on billing repair card is less than one-half pound, it must be dropped; if one-half pound or more, charge the entire pound."

Explanation: This will greatly simplify billing by eliminating fractional pounds on billing repair cards. This practice is now followed by a great many roads, but certain roads are resorting to the practice of checking up the fractional pounds on bolts, nuts and forgings, and asking for offset authority to cover the difference in the material as charged by calculating fractional pounds. This results in a great deal of unnecessary checking and correspondence; and it is felt that the even pound basis is entirely equitable.

RULE 107.

It is recommended that each item of labor in this rule be numbered, for convenience in referring to certain items of labor in correspondence.

Page 140, change item "Anchor or lug straps, one, renewed, 1 hour labor, charge $0.28" to read "Anchor or lug straps (for side and end planks on gondola cars) one, renewed, 1 hour labor, charge $0.28."

Explanation: To avoid confliction with item on page 166, which reads "Strap or anchor bolt, one, renewed, ¾ hour."

Page 140, change item "Anchor or lug straps, blacksmith labor, repairing, including R. & R., 1¾ hours labor, charge $0.49" to read "Anchor or lug straps (for side and end planks on gondola cars) blacksmith labor repairing, including R. & R., 1¾ hours labor, charge $0.49."

Explanation: To avoid confliction with item on page 166, which reads "Strap or anchor bolt, one, renewed, ¾ hour."

Page 140, change item "Arch bar, drawing down, 1 hour labor, charge $0.28" to read "Arch bar, one, drawing down (when necessary to raise end of car in order to draw down), 1¼ hours labor, charge $0.35; one additional at same end, ¼ hour labor, charge $0.07."

Explanation: The present price for drawing down

> arch bars is badly abused, on account of being used by C. T. Yard Inspectors in connection with the tightening of column bolt nuts; and it is felt this item should only be used when it is necessary to raise the end of car, in order to draw down the arch bar.

Page 142, insert the following item: "Bolster, truck, one, renewed, when one or more truck transoms are renewed in same truck, 2 hours labor, charge $0.56."

> Explanation: Not covered by the rules.

Page 142, insert the following item: "Bolster, truck, wooden, removing and replacing to make other repairs (when necessary to remove bolts or rivets to remove bolster from truck,) 6 hours labor, charge $1.68."

> Explanation: Not covered by the rules.

Page 142, eliminate the following item: "Brake beam, wooden truss, repairing, 1¼ hours labor, charge $0.35."

> Explanation: After October 1, 1916, cars equipped with wooden brake beams will not be accepted in interchange.

Page 142, eliminate the following item: "Brake beam head (wooden beam), one, renewed, ¾ hour labor, charge $0.21."

> Explanation: After October 1, 1916, cars equipped with wooden brake beams will not be accepted in interchange.

Page 144, eliminate the following item: "Brake beam head (wooden beam), two on same beam, renewed, 1 hour labor, charge $0.28."

> Explanation: After October 1, 1916, cars equipped with wooden brake beams will not be accepted in interchange.

Page 146, first item below note, change to read: "Coupler stop bolts, lug strap bolts, draft timber crosstie bolts at same end of car when coupler is not removed.'

> Explanation: The words "or coupler follower guide bolts" have been eliminated for the reason that this item is not analagous to the other items covered. These

bolts should be applied at ¼ hour under the item "Bolts, 6-inch or less in length."

Page 148, eliminate the following item: "Coupler, with stem attachments, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or more coupler stops, renewing or replacing, any or all at same end of car, at same time, 3½ hours labor, charge $0.98."

> Explanation: Couplers with stem attachments have not been accepted in interchange since October 1, 1914; and after October 1, 1916, cars equipped with American continuous draft attachments will not be accepted in interchange.

Page 148, insert the following item: "Coupler cross key, blacksmith labor repairing, ½ hour labor, charge $0.14."

> Explanation: This to take the place of item on page 152, which reads "Draft rod key, repaired, 1 hour."

Page 148, insert the following item: "Coupler springs, followers, or complete gear, (key attachments) any or all, replacing or renewing when coupler is not renewed, per end, 2 hours labor, charge $0.56."

> Explanation: The allowance of 2 hours as shown here is recommended on the basis of the present hourly allowances specified for couplers with key attachments; and should, of course, be increased to correspond with any increase that is made in the allowances now in the rules for this type of coupler. This additional item is necessary for the reason that it is not now covered by the rules.

Page 152, eliminate the following items:

"Drop end gate (one plank), plain, renewed, 1½ hours labor, charge $0.42."

"Drop end gate (one plank), metal bound, renewed, 2 hours labor, charge $0.56."

"Drop end gate (two or three plank), plain, renewed, 3 hours labor, charge $0.84."

"Drop end gate (two or three plank), metal bound, renewed, 5 hours labor, charge $1.40."

> Explanation: The separate allowances that are now provided for renewing end gates and for renewing end gate planks, are conflicting; and it is felt that this work should be covered on the basis of end gate planks renewed, separately.

Page 152, change the following items:

Change item "Drop end gate plank, plain, one, renewed, 1½ hours labor, change $0.42." to read "Drop end gate plank, plain, one, only, renewed, 2½ hours labor, charge $0.70."

Change item "Drop end gate plank, plain, two on same end, renewed, 2 hours labor, charge $0.56." to read "Drop end gate plank, plain, two or more on same end, each, renewed, 1¾ hours labor, charge $0.49."

Change item "Drop end gate plank, metal bound, one, renewed, 2½ hours labor, charge $0.70." to read "Drop end gate plank, metal bound, one only, 4¼ hours labor, charge $1.19."

Change item "Drop end gate plank, metal bound, two, same end, renewed, 4½ hours labor, charge $1.26." to read "Drop end gate plank, metal bound, two or more at same end, each, renewed, 2¾ hours labor, charge $0.77."

> Explanation: The separate allowances that are now provided for renewing end gates and for renewing end gate planks, are conflicting; and it is felt that this work should be covered on the basis of end gate planks renewed, separately.

Page 154, insert the following item: "Grain strip, renewed, separately, per lineal foot, charge $0.02."

> Explanation: Not covered by the rules.

Page 156, insert the following item: "Journal box, renewed, in connection with wheel renewals, ½ hour labor, charge $0.14."

> Explanation: This item is not specifically covered in the present rules, but should be shown for the reason that additional labor is involved, on account of removing and replacing the old journal box lid and dust

guard. The price recommended is the same as now shown in the rules for journal box lid.

Page 156, insert the following item: "Nuts, tightening, except where included in cost of other operations, each, charge $0.01."

Explanation: This is a very common item of repairs and is not covered in the present rules.

Page 158, change item "Rod, transverse tie, one, applied, first application, including drawing sides of car together, 2 hours labor, charge $0.56." to read "Rod, transverse tie, one, applied, first application, including drawing sides of car together (does not apply to steel cars), 2 hours labor, charge $0.56."

Explanation: Present allowance was established to cover wooden cars only; and on account of work involved in straightening the sides of steel cars, it is felt that charge should be made on cost basis.

Page 158, change item "Safety valves, one or two, per tank, testing and stenciling only, 1 hour labor, charge $0.28." to read "Safety valve, tank car, one, testing, stamping valve, and stenciling body of tank, 1 hour labor, charge $0.28; each additional, ½ hour labor, charge $0.14."

Explanation: The word "Stenciling" in the present rule should read "Stamped," in order to comply with Tank Car Specifications, and this item should also cover the stenciling on body of tank.

Page 160, change item "Safety valve, one, per tank, testing and stenciling, 2 hours labor, charge $0.56." to read "Safety valve, tank car, one, adjusting, testing, stamping valve, and stenciling body of tank, 3 hours labor, charge $0.84; each additional, 1 hour labor, charge $0.28."

Explanation: The word "Stenciling" in the present rule should read "Stamped," in order to comply with Tank Car Specifications, and this item should also cover the stenciling on body of tank.

Page 166, change item "Strap or anchor bolt, one, renewed, ¾ hour labor, charge $0.21." to read "Strap or anchor bolt, (for end sills, draft timbers, end plate, etc.) one, renewed, ¾ hour labor, charge $0.21."

> Explanation: To avoid confliction with item "Anchor or lug straps" on page 140.

Page 166, change item "Sub-flooring, including cleats, when not associated with sill renewals, per lineal foot, charge $0.04." to read "Sub-flooring, including cleats, when not associated with the sill renewals on either ordinary cars or refrigerator cars; also, when necessary to remove and replace or renew in connection with other repairs on ordinary cars, per lineal foot, chage $0.04."

> Explanation: This recommendation is made for the reason that the rule can be construed as not permitting an additional charge for the removing and replacing, or renewal of sub-flooring on box cars; and as the labor allowances for sill renewals on ordinary cars were worked up to cover cars without sub-flooring, the rule should be changed as recommended, in order to permit of an additional charge for sub-flooring on ordinary cars.

Page 168, insert the following item: "Truck side, cast steel, (not including R. & R. rivets), one, renewed, 7½ hours labor, charge $2.10."

Page 168, insert the following item: "Truck side, cast steel, (not including R. & R. rivets), two, same truck, renewed, 10¾ hours labor, charge $3.01."

> Explanation: Cast steel truck sides are in general use, but the present rules do not specify any allowance for same, with the result that there is practically no uniformity in billing for this work.

RULE 111.

It is recommended that the basic units shown on page 188, as well as all of the details of the various prices as shown on pages 174 to 188, inclusive, be eliminated.

> Explanation: The present basic units as shown in Rule 111 are not representative of actual costs, and therefore should be eliminated and the necessary revision made in the total allowance for the various

operations to conform to actual costs. These details serve no practical purpose, as it is understood that the price shown for any item of repairs includes all operations necessary to complete the repairs. The basic units were originally incorporated in Rule 111 to indicate the detail operations that were necessary to complete an item of repairs, but as they have served their purpose in this respect, there is no reason to retain them any longer in the rules.

In the following recommendations where increases in prices have been shown, the recommended price covers the actual direct labor cost, plus 44.4% to cover overhead expenses:

Page 174, change item "Check valve case, spring gasket, or all, R. & R., $0.10." to read "Check valve case, spring, gasket, any or all, R. & R. when triple valve is not removed from car for cleaning or repairs, $0.10."

> Explanation: A comma has been inserted after the word "spring." Also, the word "any" has been added after the word "gasket," and the additional wording provided to indicate when this price is to be used.

Page 174, change item "Cut-out cock, R. & R., $0.09." to read "Cut-out cock, R. & R., per connection, $0.03."

> Explanation: As the amount of work or number of connections necessary to R. & R., in order to remove cut-out cock, vary on the different classes of cars, it is not considered equitable to establish an arbitrary price, but instead to base the charge on the actual number of connections necessary to make.

Page 174, change item "Cut-out cock, grinding in, R. & R., $0.30." to read "Cut-out cock, grinding in (not including R. & R.), $0.20."

> Explanation: The wording has been changed to permit charging for removing and replacing cut-out cock on a connection basis, and the price has been changed to $0.20, to correspond with the price of $0.28 for removing, replacing and grinding in angle cock; the latter price includes $0.08 for removing and replacing the angle cock, leaving $0.20 for grinding in.

Page 174, change item "Cut-out cock handle, renewed, $0.04." to read "Cut-out cock handle, renewed (not including connections necessary to R. & R. cut-out cock), $0.04."

> Explanation: The wording has been changed to indicate that it is necessary to remove and replace cut-out cock in order to properly perform this work, and that an additional charge can be made for necessary connections.

Page 174, change item "Cylinder, R. & R., detachable, $0.23." to read "Cylinder, detached type, R. & R. (including necessary connections) when removed to make other repairs to car, where removing and replacing cylinder is not included in labor allowances for other items of repairs, $0.23."

> Explanation: The wording changed to indicate when this price is to be used.

Page 174, insert the following item: "Cylinder or cylinder gasket, either or both (including removing cylinder from car, cleaning and oiling cylinder, and cleaning weighted valve and seat in retaining valve), renewed, $0.90."

> Explanation: This operation is not covered by the present rules. The price shown covers the operations as indicated in parenthesis, for the reason that they are considered necessary to insure effective operation of the brake when this operation is performed.

Page 176, change item "Cylinder, R. & R., combined type, $0.30." to read "Cylinder or cylinder gasket, combined type, either or both (including removing both cylinder and reservoir from the car, cleaning and oiling cylinder, and cleaning weighted valve and seat in retaining valve), renewed, $1.06."

> Explanation: The wording of this item has been changed to cover the renewal of the cylinder, as well as the gasket, as these two operations are analagous. The price has been increased to include the operations as indicated, for the reason that they are considered necessary to insure efficient operation of brakes when these parts are renewed.

Page 176, change item "Cylinder and reservoir, R. & R., $0.41." to read "Cylinder and reservoir, combined type, R. & R., (including necessary connections), when removed to make other repairs to car, where removing and replacing cylinder is not included in labor allowances for other items of repairs, $0.45."

> Explanation: The wording of this item has been changed in order to more clearly indicate when this price is to be used. Price has been increased to cover actual cost.

Page 176, insert the following item: "Cylinder and reservoir, combined type (including cleaning and oiling cylinder, and cleaning weighted valve and seat in retaining valve), renewed, $1.11."

> Explanation: This item is not covered by the present rules. The reference to cleaning cylinder and retaining valve is shown for reasons previously given.

Page 178, change item "Cylinder cleaned, oiled, tested and stencilled, including obliterating old stencil marks, $0.38." to read "Cylinder cleaned, oiled, tested and stencilled, including removing piston follower and packing leather, cleaning weighted valve and seat in retaining valve, and obliterating old stencil marks, $0.55."

> Explanation: The wording of this item has been changed and the price adjusted to cover the removal of piston follower and packing leather, and also the cleaning of retaining valve, for the reason that the packing leather should be removed to insure proper inspection; and since it is essential that the retaining valve be in condition to properly perform its function, it should be cleaned whenever it is necessary to clean and lubricate the cylinder.

Page 178, change item "Cylinder release springs, R. & R., $0.11." to read "Cylinder release spring removed, when piston is not removed for any other purpose (including cleaning and oiling cylinder, and cleaning weighted valve and seat in retaining valve), $0.51."

> Explanation: The wording has been changed to make it clear when this price is to be used, and to indicate

that the cylinder and retaining valve should be cleaned when this operation is performed.

Page 178, eliminate the following item: "Cylinder gasket, R. & R., $0.25."

Explanation: This item should be eliminated, as it should be included in the recommended item on page 176, "Cylinder or cylinder gasket, combined type, either or both, renewed."

Page 178, change item "Emergency check valve, grinding in, $0.10." to read "Emergency check valve, grinding in (not to be used when triple valve is cleaned), $0.10."

Explanation: The wording of this item has been changed to indicate that a separate charge should not be made for grinding in check valve when triple valve is cleaned, as it is felt that the cost of this operation should be included in the price for cleaning triple valve.

Note: See explanation in connection with price for cleaning triple valves.

Page 180, change item "Emergency valve piston, R. & R., $0.10." to read "Emergency valve piston, R. & R. (when triple valve is not removed for cleaning or repairs), $0.10."

Explanation: To clarify the rule, and indicate when this item is to be used.

Page 180, change item "Emergency valve seat, R. & R. (see E. V. piston), $0.10." to read "Emergency valve seat, R. & R. (when triple valve is not removed for cleaning or repairs), $0.10."

Explanation: To clarify the rule, and indicate when this item is to be used.

Page 180, change item "Emergency valve, rubber seat, R. & R., $0.10." to read "Emergency valve rubber seat, renewed (when triple valve is not removed for cleaning or repairs), $0.10."

Explanation: To clarify the rule, and indicate when this item is to be used.

Page 180, eliminate the following item: "Cylinder piston packing, R. & R., $0.13."

Explanation: This item should be eliminated for the reason that the cost of removing piston follower and packing leather has been included in the price for cleaning, oiling, etc., of cylinder, and it is not good practice to renew a packing leather without cleaning the cylinder at the same time.

Page 180, change item "Cylinder piston, R. & R., $0.15." to read "Cylinder piston or rod (including cleaning and oiling cylinder, and cleaning weighted valve and seat in retaining valve), renewed, $0.73."

Explanation: The wording has been changed to cover either the piston or the rod when renewed, separately, and also to indicate that both the cylinder and retaining valve should be cleaned when this work is performed.

Page 180, insert the following item: "Cylinder piston and rod (both), renewed, (including cylinder cleaned and oiled, and cleaning weighted valve and seat in retaining valve), $0.59."

Explanation: This item is not covered by the present rules. The wording as given indicates that both the cylinder and retaining valve should be cleaned when this work is performed.

Page 182, change item "Packing leather expander, renewed (see cylinder piston), $0.07." to read "Packing leather expander, renewed (see cylinder cleaned, oiled, etc.), $0.00."

Explanation: The same operations are necessary for renewing packing leather expander as are necessary in the case of cleaning, lubricating, etc., of cylinder, as it would not be good practice to renew this expander without thoroughly cleaning the cylinder.

Page 182, change item "Push rod, R. & R., (one connecting pin), $0.03." to read "Push rod, renewed, separately, $0.03."

Explanation: This price is only used in connection with renewing a push rod.

Page 182, change item "Release valve, renewed, $0.06." to read "Release valve, renewed, including release valve rods, R. & R., $0.13."

Explanation: Wording changed to clarify the rule.

Page 182, change item "Release valve, removed, repaired and replaced (R. & R., 4 cents), $0.09." to read "Release valve, removed, repaired and replaced (including release valve rods, R. & R.), $0.18."

Explanation: Wording changed to clarify the rule.

Page 184, change item "Reservoir, R. & R., $0.29." to read "Reservoir, detached type, R. & R., when removed to make other repairs where R. & R. reservoir is not included in other items of repairs, $0.32."

Explanation: Wording changed to indicate that this item is only to be used when cost of the operation is not included in the allowances for other repairs.

Page 184, insert the following item: "Reservoir, detached type, renewed, including necessary connections, $0.54."

Explanation: This operation is not covered in the present rules.

Page 184, insert the following item: "Reservoir, combined type (including cylinder and reservoir removed from car, cylinder cleaned, also weighted valve and seat in retaining valve cleaned), renewed, $1.21."

Explanation: This item is not covered by present rules. The proposed wording makes clear that both cylinder and reservoir must be removed from car to properly perform this operation, and that both the cylinder and retaining valve should be cleaned.

Page 184, eliminate the following item: "Removing cylinder cap (3 nuts, ½ in., one cent each), $0.03."

Explanation: The present item covering removing of cylinder cap is not used, except in connection with the renewal of triple cylinder cap gasket when triple valve is not removed from car. This operation is usually performed in C. T. Yards, and is covered on page 186 by the item "Triple cylinder cap gasket, renewed."

Page 184, eliminate the following item: "Removing slide valve (3 nuts, ½ in., one cent each), $0.03."

> Explanation: This operation is not performed, except in connection with cleaning or repairs to triple valve at shop.

Page 184, insert the following item: "Retaining valve, weighted valve and seat in, cleaned and tested (when not in connection with cleaning cylinder), $0.06."

> Explanation: This operation is not covered in present rules, but is necessary in order that the retaining feature of the valve will be properly maintained.

Page 184, change item "Retaining valve, repaired, $0.25." to read "Retaining valve, removed, repaired and replaced (including grinding in key), $0.41."

> Explanation: On account of the recommendation for eliminating the details, the wording has been changed to cover the removing and replacing of valve, in addition to the repairs; and price increased to cover actual cost.

Page 184, change item "Retaining valve, R. & R. (2 lag screws, 2 cents, valve, 3 cents), $0.05." to read "Retaining valve R. & R. (when necessary to R. & R. in connection with other repairs covered by rivet allowances), including bolts or lag screws, and one connection, $0.11."

> Explanation: Wording has been changed, in order to clarify the rule and to cover retaining valve secured with bolts. Price has been increased to cover actual cost.

Page 184, change item "Slide valve, removed, ground in and replaced, $0.33." to read "Slide or exhaust valve, removed, seat and valve faced, ground in and replaced, $0.74."

> Explanation: Wording changed in order to cover New York type of valve; also, to provide for proper facing of valve and seat before grinding in. Price has been increased to cover actual cost.

Page 186, eliminate the following items:

"Slide valve spring, R. & R., $0.06."

"Slide valve spring, R. & R., removing riveted pin, $0.04."

> Explanation: These items are unnecessary, as the operations are included in the cleaning of the triple valve.

Page 186, eliminate the following item: "Strainer, renewed (disconnecting union), $0.03."

> Explanation: This operation is only performed in connection with other work which will include the renewal of strainer.

Page 186, change item "Triple cylinder bushing, reground or refitted, $1.12." to read "Triple cylinder bushing, reground including renewal or refitting packing ring, $0.72."

> Explanation: The present price of $1.12 is used both when a triple cylinder bushing is renewed and when bushing is only reground, and as there is considerable difference in the cost of the two operations they should be separated. The wording has also been changed to cover the renewal or refitting of piston packing ring, as the regrinding of bushing necessitates the renewal or refitting of piston ring. See recommendation in Rule 101 for renewal of triple cylinder bushing.

Page 186, eliminate the following item: "Triple cylinder cap., R. & R. (3 nuts, ½ in., one cent each), $0.03."

> Explanation: This item is covered by the item "Triple cylinder gasket renewed," and therefore is not necessary.

Page 186, change item "Triple cylinder cap gasket (3 nuts, ½ in., one cent each., gaskets, two cents), $0.05." to read "Triple cylinder cap gasket, renewed, $0.07."

> Explanation: The details have been omitted and price increased to $0.07, as this item will only be used where triple cylinder cap gasket is applied in C. T. Yards, without removing triple valve from car.

Page 186, change item "Triple valve removed, cleaned, oiled, tested and stencilled, $0.45." to read "Triple valve removed, cleaned, oiled and stencilled, including grinding in check valve, $0.45."

Explanation: Wording has been changed to indicate that check valve should be ground in when triple valve is cleaned and that same is included in price for cleaning. This is considered necessary, as the majority of check valves require grinding, and if not ground in while valve is dismantled, it is necessary to again dismantle valve for this operation if test shows check valve leakage.

Page 188, insert the following item: "Testing air after repairs to piping (not to be used in connection with air hose or angle cock R. & R. or renewed, or where the cleaning of cylinder or triple valve is involved), $0.05."

Explanation: The labor allowances for pipe work are on a connection basis and do not cover the cost of testing, and as all pipe work should be tested, this price is considered equitable.

Page 188, change item "Union, disconnect and connect, $0.03." to read "Union, disconnect and connect each, $0.03."

Explanation: To clarify the rule.

RULE 116.

Page 200, first item under heading "Bodies of eight-wheel cars, steel;" change dimension in second line to read "38 feet, 6 inches."

Explanation: To correct error in printing, and avoid confliction with the second item.

Page 200, fourth item under heading "Bodies of eight-wheel cars, steel;" insert comma after the word "capacity" in second line, and eliminate comma after the word "over" in second line.

Explanation: To correct error in printing.

Page 204, new paragraph: "On cars equipped with eight-inch air brake equipment, 300 pounds, and on cars equipped with ten-inch equipment, 400 pounds, should be deducted from the weight of the body. This deduction, however, does not apply to cars settled for under Rule 120."

Explanation: To correspond with interpretation of Arbitration Committee, on page 4, Circular No. 10.

Page 225. Illustration of Joint Evidence Card.

Change wording of last line to read,

"Disposition of car. Repaired at.........................Shop;
"Date....................................19........"

Explanation: To conform to recommendation in Rule 13.

Pages 228 and 229 .. Illustrations of Billing and Record Repair Cards.

These forms to be revised as per illustration shown below.

M. C. B. ASSOCIATION—RECORD REPAIR CARD

(Name of Railroad)

END.	REPAIRS MADE	NET PRICE	IRON			Chain	Lumber	Springs	Cast Steel	HOURS LABOR	WHY MADE
			Cast	Wrot	Mall.						
	TOTAL										

DATE...191...... REPAIRED AT.. INSPECTOR..

CAR NO. ....INITIAL OR NAME...KIND..

TO BE RETAINED BY PARTY MAKING REPAIRS.

Explanation: The additional columns for "Hours Labor" has been added in accordance with recommendation under Rule 9, and also for the purpose of indicating that the labor charge should be shown opposite each operation; this will greatly facilitate the checking of charges, also reduce correspondence. The heading "Net Price" in present blank column should be shown, as this column is now generally used for this purpose. The provision for showing the "Total" of each column is important, in order to facilitate billing.

CAR SERVICE RULE 15.

Page 234, paragraph (a), eliminate the words "Section (f)."

Page 234, paragraph (d), insert the word "the" after the word "pass" in first line, and eliminate the words "third rail" from first and second lines.

Explanation: To conform to Car Service Rule 15, as revised, November 17, 1915.

RECOMMENDED CHANGES IN 1915 CODE M. C. B. PASSENGER CAR RULES OF INTERCHANGE.

RULE 3.

Section (d), first paragraph, change to read "Equipment, tools and emergency repair parts missing from the inside of passenger carrying cars, baggage, mail and express cars, are an owners' responsibility."

Explanation: To correspond with interpretation in Circular No. 10.

RULE 4.

First paragraph, change to read "The company making the repairs not pro-ratable as Line Expense is privileged to bill the car owner for these repairs, unless there is evidence to indicate that the damage was occasioned by unfair handling on the part of the handling company."

Explanation: To clarify the rule.

RULE 6.

After the word "charge" in second line, add the words "(if necessary to apply)."

Explanation: To clarify the rule.

RULE 9.

Change note to read:

"For loss of service metal on slid flat wheels, one-eighth inch will be allowed for flat spots two and one-half inches long or less; and one-sixteenth inch for each additional inch or fraction thereof.

"Any additional loss of service metal that is necessary to remove on account of worn flange or tread must be borne by car owner."

Explanation: Change to conform to the allowances and provisions of Rule 98 for removing flat spots from steel-tired wheels under freight cars; and for the additional reason that it is difficult to remove less than one-eighth inch service metal in removing flat spots from steel wheels. Therefore, the one-sixteenth inch allowance for flat spots under two and one-half inches has been changed to one-eighth inch.

RULE 10.

Paragraph (b), insert a comma after word "bent" in first line.

Explanation: To clarify the rule and to indicate that axles cannot become bent in fair service.

RULE 12.

Section (a), change to read "Brakes must be in perfect working order. Cylinders, triple valves and slack adjusters must have been cleaned and oiled within six months, and in the case of cars equipped with high-speed brakes, the triple valves must be cleaned within three months, and the high-speed valves within six months; and date of last cleaning and oiling of the respective parts plainly stencilled on the brake cylinder or reservoir with white paint."

Explanation: It is felt that high-speed valves need not be cleaned within less than six months, and further provision has been made for stenciling the date of last cleaning and oiling on brake cylinder and reservoir instead of on brake cylinder and triple valve.

RULE 16.

Change the word "one" to "two" before the word "inch."

Explanation: The practice of removing wheels from passenger equipment cars on account of flat spots less than two inches in length results in unnecessary expense for labor and loss of service metal, as flat spots less than two inches in length do not affect the safety of car, riding of the car, or the track structure.

RULE 20.

Change to read:

"Separate bills must be rendered monthly for,

(a) Line Expense,
(b) Repairs,
(c) Cars Destroyed,

the prices for materials and labor to be governed in accordance with the accompanying schedule."

Explanation: To conform to the requirements of the various Accounting Departments. This also corresponds with the practice followed in rendering bills for repairs to Freight Equipment cars.

Pages
276 to 280, "Prices For Labor and Material."
inclusive.

The items of labor should be separated from the items of material and shown under the heading of "Labor." A separate rule number should be assigned to the material and labor charges, and each item of labor and material should be numbered.

Explanation: The labor and material items are now shown together and by supporting them under separate rule numbers, with each individual item numbered, will enable a quick reference and conform to recommendations made for Rules 101 and 107, in the Freight Car Rules.

DISCUSSION

MR. KLEINE: We have with us Mr. A. B. Smith, Assistant Master Car Builder of the Union Tank Line and I would move that the privilege of the floor be extended to him.

PRESIDENT: We will be very glad to hear from Mr. Smith.

MR. A. B. SMITH: Mr. President and members of the Club: The axle matter has been a very vexations one to us. In 1908 the larger axles were made M. C. B. standard for tank cars and we have had a great deal of difficulty in maintaining these axles due to the fact that the railroads when changing wheels under tank cars put into cars axles which they had in stock. Usually they met the requirements only for cars marked capacity. The Interstate Commerce Commission has adopted the requirements of tank cars as the Federal law and this means that we must maintain large axles under tank cars and when the railroads apply small axles it is necessary for us to remove them when the car is returned home. We have had a great many discussions with the different railroads on account of the removal of those small axles as the railroads felt that it was an injustice for us to ask them to pay for axles which they use under ordinary freight cars. But you can readily see that when the Interstate Commerce Commission adopted the requirements for tank cars and made these the federal law we have to comply with those requirements.

I want to take this opportunity of congratulating Mr. Kleine's committee on the way this axle matter has been handled, and I certainly hope that the Arbitration Committee will at least give these rules a trial.

In regard to the circular sent out by the Executive Committee limiting the acceptances of cars fitted with safety appliances up only to six months prior to July 1, 1917, that requirement would work a great hardship on us as we are extremely short of cars at the present time and as our cars travel all over the United States and at some points we have no facilities for equipping cars with safety appliances this would mean that we shall have to bring cars at outlying points a great distance and shippers will be deprived of the use of those cars I certainly hope the Executive Committee will accept Mr. Kleine's recommendation to reduce this period to three months.

MR. KLEINE: I might make a further explanation in regard to the two types of axles which were originally in the rules of interchange and which have again been incorporated in the rules of interchange through circular No. 6. The non-standard M. C. B. axle is an axle that was in service prior to the time the M. C. B. committee on axles of which Mr. Nelson was chairman went over the axle requirements and formulated a new set of limits for axles based on certain strains in the axle. That made the axle which had been in use prior to that time have limits smaller than the limits adopted by the committee. After that committee reported its findings the Association adopted the Committee's recommendation for standard M. C. B. axles. That places in service two kinds of axles, one with limits which are smaller than the other. The M. C. B. rules have never properly taken care of the interchange of those axles in repairs. A road or individual car owner applies standard M. C. B. axles to a car and another road, in making repairs, applies one of the old M. C. B. standard axles below the dimensions of the new standard. That car then has an obsolete axle. It is our idea to do away with the non-standard axle after October 1, 1920, which gives the railroads sufficient time to change those axles and put in standard M. C. B. axles. There are also cars running which have odd lengths of axles and it is the intention that after October 1, 1920, all cars should be equipped with M. C. B. standard. As the rules now stand all cars must be equipped with M. C. B. standard axles after October 1, 1916, which will not give time to make the change and the cost would be prohibitive. The recommended rules were revamped on that basis.

We have with us Mr. Sitterly, Vice-President of the Central Railway Club of Buffalo, N. Y., and I would suggest that the privilege of the floor be extended to him.

MR. W. H. SITTERLY: Mr. President and members of the Railway Club of Pittsburgh—I do not know that I can add anything to what has already been so well covered by your Rules of Interchange Committee in their report. I concur in their views with reference to the time limit proposed to be recommended by the Executive Board of the M. C. B. Association for several reasons:

First—On account of the inability of working foreign cars home.

Second—It would be pretty hard work to get the stragglers or the last batch of cars into shop for the changes.

Third—At present it is almost impossible to secure material with which to manufacture safety appliances. We are having, and I believe other roads are having the same difficulty in getting proper material.

With reference to the changes in air brake prices for labor and material, as covered by Rules 102 and 111. I think the Committee's recommendations are a step in the right direction. As stated by your Committee, as they now appear in the Rules, they were proper for the earlier type of equipment, but now do not serve the purpose. For some reason or other, for a number of years, the air brake prices have not received the consideration they should, making it almost impossible for an M. C. B. bill clerk to intelligently make out a bill, and a great many exceptions are taken by various railroads to bills rendered against them for the reason that the items are not covered in the M. C. B. Rules of Interchange.

This afternoon the Pittsburgh Air Brake Club forwarded to the Arbitration Committee, recommendations similar to those presented by your Committee this evening. I believe it is the first time that any Air Brake Club has ever presented recommendations covering the prices of labor and material for air brake work to the M. C. B. Association, and we hope that these recommendations will receive consideration and that the Rules will be so clarified that we can bill intelligently.

I have gone over the report of your Committee for several years and this Committee is to be complimented on the manner in which they present their report.

The Central Railway Club, the same as other Clubs, present certain recommendations each year. We cannot hope to have all recommendations recognized and put into effect by the Arbitration Committee, but we do get a little each year and receive very good consideration from the Arbitration Committee.

PRESIDENT: Is there any further discussion? If not, what is your pleasure as to the report?

ON MOTION the Report was adopted as a whole and ordered referred to the M. C. B. Arbitration Committee for consideration at their next meeting.

PRESIDENT: We have with us Mr. E. S. Way, General Foreman M. C. B. Clearing House, Altoona, Pa., who will present a paper on "Methods of Handling Repairs to Foreign Cars and Billing for the Same." It is my pleasure to introduce Mr. Way.

MR. E. S. WAY: Mr. President and members of The Railway Club of Pittsburgh—In preparing this paper it was not my thought to approach the subject of freight car repairs from a shop practice or mechanical standpoint but only to deal with it insofar as it is related to M. C. B. billing. With that thought in mind I will ask your consideration for a short time while I endeavor to outline some of the more important points that should be borne in mind in handling this work.

METHOD OF HANDLING REPAIRS TO FOREIGN CARS AND BILLING FOR SAME.

By E. S. Way.

To the Officers and Members
of The Railway Club of Pittsburgh:

With the extension and growth of railway transportation facilities, it became necessary to perfect a system whereby the interchange of freight cars between railroads, regardless of the ownership of equipment, would be possible, and at the same time the car owner would be protected against unusual damage to his equipment · also, that the car owner would reimburse the handling line for repairs made, due to ordinary wear and tear. This was accomplished by the formulating of a code of rules, by the Master Car Builders' Association, governing the interchanging of and repairs to, freight cars, which rules, also, classified defects or damage, as between owners and handling line's responsibility. Up to within a comparatively few years, these rules, although making possible the interchange of cars, operated adversely against the prompt movement of traffic at Junction points, due to the receiving line being permitted to reject both loaded and empty cars when same were defective. This condition was further aggravated on account of the handling or delivering line being held responsible for numerous defects.

The present rules of interchange which are the outcome of revisions from year to year, to be consistent with changing conditions, are, however, so broad and liberal that freight cars can now move practically unrestricted over the country and today the car owner is, with a few exceptions, that are specifically provided for in the rules, responsible for all repairs that are not due to wreck or derailment; in fact a foreign car cannot, at the present time, be sent home for repairs unless the road having the car in its possession has direct connection with the owning road. Therefore, the repairs to or maintenance of, freight equipment cars while away from the home road has necesarily developed into one of the most important of the many phases of railroad work.

If you will consider for a moment that approximately $182,-

000,000.00 is expended annually by the railroads of the United States for repairs to freight cars and that conservatively estimated, 20 per cent of this amount, or $36,000,000.00, involves repairs to cars on foreign roads, and consider also that this enormous sum of money is exchanged between railroads without any definite means of checking against the work performed by repairing lines, it will be realized that the repairing of foreign cars and billing for same occupys a unique position in business annals, for the reason that there is, perhaps, no other line of business where such large sums of money are exchanged merely on the basis of common honesty.

With approximately 2,000,000 freight cars moving freely over the country subject to repairs first by one road and then by another, it will also be readily appreciated, that in order to protect the car owner, and that the principles upon which this important branch of railroad work is founded, may be safeguarded, two things are necesary: First, adequate supervision; and secondly, a thorough and efficient system of preparing original records and compiling charges from such records.

The question of supervision is one that cannot be taken up in detail in this paper, as such details are effected to a great extent by local conditions; but there are several points in this connection which, in my opinion, are worthy of consideration.

Shop Supervision, insofar as it relates to M. C. B. work, need not, ordinarily, cause much concern, for the reason that the majority of the shops have well-organized forces, particularly where the work is handled on a piecework basis. This fact is not true of the work performed in transportation yards, for the reason that the work of individual inspectors or repairmen cannot be personally supervised by the foreman. Therefore, the possibilities for erroneous charges originating in C. T. Yards are much greater than is the case with charges originating from regular shop tracks.

On account of repairs made in C. T. Yards representing, individually, very small amounts, it may not occur to some that this branch of the work warrants special attention; but, as previously stated, as it is impossible for the foreman to personally supervise the repairs to each individual car, and the necessity, therefore, of depending upon each workman to make proper returns, and the further fact that these charges in the aggregate involve considerable sums of money, it is imperative that a clearly defined system be established for checking up this work. This can be accomplished by delegating competent men to make periodical checks of the work performed by each inspector or repairman at all yard repair points. These investigations should be in the nature of a surprise check in order to realize the best results.

Another feature in connection with the supervision of repairs to foreign cars which may be productive of splendid results, if handled along the proper lines, is the centralizing of M. C. B. billing work at one point on a system. Where the centralization idea is carried out and the billing repair cards from all points on the system are forwarded to one central office, a great deal of valuable information reflecting the conditions, as well as the practices at the various repair points, can be obtained by carefully analyzing the character of the charges, reasons shown for making the repairs, etc. In other words, where this system is in effect the billing repair cards covering the charges against two or three roads, selecting different roads each month, should be sorted out by stations before bill is rendered. This will permit of a careful comparison of the work performed at the various repair points and will readily disclose a tendency on the part of one point toward specializing on certain items of repairs, the use of stereotype terms in designating reasons for repairs, etc.

Where such tendencies are apparent, an immediate investigation can be made with a view of determining whether or not there is any special reason for such conditions existing, and if necessary, corrective measures can be applied. Briefly, the plan outlined will enable those in charge of the M. C. B. work to keep in close touch with the conditions that obtain over the entire road. It is, of course, the general practice of roads to analyze the bills rendered against them somewhat along the plan as outlined above, and, while this is necessary, it is equally as important, and in fact the duty of every road to make a similar study of their own charges.

Of equal importance to the question of providing for adequate supervision, is that of providing for suitable original records, for the reason that upon the correctness of the original record depends largely the correctness of the billing repair card, which card is the basis for the exchange, monthly, of large sums of money between the railroads of the country, and in an endeavor to bring out what may be considered some of the most essential points that should be covered by original records, the forms that are used in C. T. Yards, as well as on shop and repair tracks on the Pennsylvania Railroad, Lines East of Pittsburgh, have been incorporated in this paper.

Original records may be divided into two general classes: first, Yard Inspector's or Repairman's record; second, Shop or Repair Track Record.

On account of the conditions as previously outlined under which repairs are made to foreign cars in C. T. Yards, it is apparent that special consideration should be given to providing a suitable record blank for this work. This blank should be so designed that the repairman, when he has filled in the information called for, will have a record that will show all the information necessary for the preparation of the billing repair card.

It may be interesting to consider for a moment the car inspector's record blank, form M. P. 111, as here shown in Illustration No. 1. This form has been adapted not only to a record of repairs, but also shopping records, interchange records, and in fact any inspection record which an inspector may be called upon to make. As the note at the bottom of the blank explains, the word "Defects" shown at the top of the center column, is marked out when it is used as a record of repairs; likewise, the word "Repairs" is marked out when the blank is used as a record of defects. A space is also provided for showing the reason for making repairs, and the detailed instructions which govern the use of this form emphasize the importance of showing in the space referred to the ACTUAL REASONS for making the repairs; in other words, the practice of using sterotyped terms is positively prohibited and no report covering repairs is acceptable unless the reason for making same are shown.

Your attention is particularly drawn to the extreme right-hand column under the heading "N. B. or B. O." The letters "N. B." stand for the words "No bill", while the letters "B. O." represent the words "Bill owners." This column may not, at first thought, appeal to many as being very important; yet it was

M. P. 111

5 10 1915
1509 8 x 3½

PENNSYLVANIA RAILROAD COMPANY

P., B. & W. R. R. CO   W. J. & S. R. R. CO.

Place ________ Date ________ Received from ________

NUMBER	INITIALS	KIND	X or ▬	DEFECTS OR REPAIRS	REASON FOR REPAIRS	End of Car	N. B. or B. O.

X Load.
▬ Empty.
N. B. No Bill.
B. O. Bill Owners.

When used for record of repairs, mark out the word "Defects". When used for record of defects, mark out the word "Repairs".

________ Inspector.

incorporated in this form in order to carry out the idea of having a record from which the billing repair card can be prepared without any assumption whatever on the part of the person making up the billing repair card, as to whether or not any item of repairs is chargeable to car owners. For example, an inspector or yard repairman might have occasion to replace roofing boards that had been damaged on account of being cornered or raked, and if he was not required to specify whether these repairs should be considered "No bill" or "Chargeable to car owners," he might merely show on his record that the boards were broken and in the absence of any other information the repairs may be charged against the car owner. It is a well known fact that inspectors not engaged in interchange inspection, or in other words, those that handle ordinary train inspection or repairs, in many instances, do not attempt to familiarize themselves with the M. C. B. Rules insofar as differentiating between handling line's and owner's defects; and, therefore, they may fail to show the necessary information on their records that will enable the party preparing the billing repair card to make proper disposition of the charge. Therefore, by requiring each inspector or repairman to determine the responsibility and indicate same by proper designating marks on their records, they are compelled to study the rules and will naturally develop into more efficient inspectors, and the records will be more reliable.

Another requirement in connection with the use of this form is that each repairman must make his own record of the repairs he makes and his personal signature must appear in the space provided for same. This requirement is considered very important and, in fact, necessary in order to obtain a reliable record, for the reason that it eliminates the undesirable practice that is frequently followed where one man is permitted or required to take the records for several men working in the same gang. Where the latter practice obtains, there is a possibility that the man held responsible for keeping this record will take a record covering certain items of repairs before the repairs are actually made, with the result that if, for any reason, the repairman fails to make the repairs, an improper charge is rendered against the car owner. Another advantage in connection with requiring each man to take his own record, is that he can be held individually responsible not only for the repairs, but also for the record.

The detailed requirements as just outlined are absolutely essential to a complete and correct record; and when proper consideration is given to the fact that the original record of repairs made is the basis for a charge against the car owner, too much importance cannot be attached to the question of providing suitable forms. This particular blank is gotten out in books of one hundred, and the blanks covering an inspector's records for a day are removed from the book and turned into the office at the close of the day. It thus has an advantage over a book record, for the reason that where a book record is used, the inspector must necessarily carry the book until it is entirely filled, with the result that it may become lost, and as is frequently the case, some of the records become blurred and illegible. Further, this blank is convenient for filing, as it can be filed either with the repair cards covering the repairs enumerated on the individual blank, or it can be filed separately, keeping each day's records together, either of which methods permits of ready reference.

Shop or repair track records are to a certain extent governed by the requirements of the various roads, and while there are not the same possibilities for improper records on shop or repair tracks as there are in C. T. Yards, the fact that the former embraces more extensive, as well as a varied class of repairs, makes it necessary that a thorough system for keeping records of this branch of the work be provided.

Illustration No. 2 shows one side of our repair card, M. P. 124, on which is recorded each operation performed, the reasons for making the repairs and the price paid the workman for the operation. The same instuctions obtain with reference to using the actual reasons for making the repairs on this form as were previously outlined in connection with the car inspector's record blank. All the information shown on this form is filled in by the piece-work inspector, who outlines the work to be performed, and who also checks the work after it is completed; and the piece-work inspector is held personally responsible for showing the correct reasons for making the repairs, as well as the operations performed.

Illustration No. 3 shows the opposite side of shop repair

REPAIRS REQUIRED.

....191

.... Inspector.

Renew	Remove & Replace	Partly R. & R.	Frame	Cause of Damage	Class of Car .... Cap'y of Car	Dolls.	Cents	Mills
					TOTAL			

M. P. 124

1191K 2-26-1914 5⅝ x 9½

PENNSYLVANIA RAILROAD COMPANY.

Philadelphia, Baltimore & Washington Railroad Company
Northern Central Railway Company
West Jersey & Seashore Railroad Company

REPAIR CARD NO. ....

....191........

To.. Gang Leader

Car No. .... Initials .... Kind ....

Commenced .... Completed ....

Light Weight .... lbs. Size of Axles ....

Charge to ....

No. of Pieces	KIND OF MATERIAL	Weight or Quantity	Price per Unit	Credit

SEAL REPORT and DAMAGED LADING.

....

....

....

....

.... Foreman.

☞When Completed, Card must be promptly sent to SHOP CLERK.

card, form M. P. 124, the particular feature of which is that the piece-work inspector, or in some instances the gang leader, is required to enumerate thereon all material used in connection with the operations that are shown on the reverse side of the card. The advantage of this method is obvious as the party preparing the billing repair card does not have to draw his own conclusion by referring to the labor operations in order to determine definitely the amount, kind or size, of material used; in other words, the party who is in the best position to know the actual operations performed, as well as the material used, viz., the piece-work inspector or gang leader, is held responsible for completing this record, and therefore responsible for the charge thus made against the car owner. An additional requirement in connection with completing this report is that the piece-work inspector is required to show whether the items of labor, as well as the items of material, are chargeable to car owner. This is accomplished by separating the chargeable items from those that are not chargeable, the former being shown under the caption "Bill owners," and the latter under the caption "No bill." Thus we have a complete record from which a billing repair card can be prepared without any question as to the proper disposition of each and every item of repairs.

The next record to which attention is directed is shown in Illustration No. 4, which, as you will note, is a shop record of the change of wheels and axles. You will understand that the shop repair card, form M. P. 124, previously referred to, merely covers the labor operation for the exchange of wheels, the reasons for repairs and the kind, and amount of material used; whereas, the form shown in Illustration No. 4 supplements the repair card by showing all of the detailed information that is necessary for preparing the wheel and axle billing repair card. This record is prepared either by the piece-work inspector in direct charge of the repairs, or by a special man who is detailed to check up the condition of the wheels and axles removed, as well as those applied; except that the amount of service metal before and after turning on wrought steel wheels is determined at the Wheel Shop when the wheels are turned. This part of the information is obtained by a report being forwarded to the Foreman of the Wheel Shop covering each pair of wrought steel wheels removed, the wheels also being properly tagged for iden-

M. P. 216 A

934C 12-8-14 8 x 5½

PENNSYLVANIA RAILROAD COMPANY

Philadelphia, Baltimore & Washington Railroad Company
West Jersey and Seashore Railroad Company

Report of change of Wheels and Axles at.................................... Date ....191.....

Initial.......................... No........................... Kind .... Capacity .... Limit Weight I ....

Max.Wt.................. Limit Weight II ....

WHEELS AND AXLE REMOVED

MAKER	Ry. Co.'s Initials	Wheel No.	Date Cast	Kind	Size	Cause of Removal	SERVICE METAL	
							Before Turning	After Turning

AXLE	Size of Journal	Diam. of Wheels Fit	Diam. of Center	Cause of Removal	Are Wheels Guaranteed ?

WHEELS AND AXLE APPLIED

MAKER	Ry. Co.'s Initials	Wheel No.	Date Cast	New or 2d-Hand	Kind	Size	Service Metal

AXLE	Size of Journal	New or 2d-Hand	Location	

Loaded or Empty..............................

....
Inspector

tification. When the wheels arrive at the Wheel Shop the amount of service metal is carefully measured before turning and again after turning, and the measurements thus taken are promptly reported to the foreman under whose jurisdiction the wheels are removed. The latter then inserts this information on the Wheel and Axle Report and the Wheel Shop Report is attached to the wheel record as a part of the permanent file. However, before filing, the billing repair card is prepared from the information shown on both the wheel report, form M. P. 216-A, and shop repair card, form M. P. 124.

The question of providing suitable forms for keeping record of triple valve repairs is an important one and therefore merits a few moments consideration.

Illustration No. 5 is a facsimile of our form M. P. 298, which is intended to take care of repairs made to triple valves at test racks. The information called for on the upper portion of the form is filled in by the repairman who removes the triple valve from the car. The form is then inserted in the check valve case and the triple valve, after being either tagged or marked so that it can be readily identified at the test rack as a foreign triple valve, is sent to the test rack where it is given preference over triple valves removed from System cars in order not to incur any unnecessary delay in preparing the billing repair card. The test rack man removes the form from the valve, and in cases where the repairs needed are of such a nature that can be performed at the test rack, he indicates just what repairs are made, as well as the reasons for same, on the blank line opposite the items that are involved. The form is then signed by the man in charge of the test rack and forwarded to the foreman under whose jurdisdiction the triple valve was removed. The foreman, in the meantime, is holding the shop repair card, form M. P. 124, which is shown in Illustration No. 1, and which covers the work performed at the car, and upon receipt of the test rack report he has all the necessary information to complete the billing repair card.

There are many triple valves, of course, which require repairs that are not ordinarily made at a test rack located adjacent to repair tracks. When the test rack man finds a valve that he cannot repair, he shows on the bottom of form M. P. 298 the shop to which the valve is to be sent for repairs, the date, and

M. P. 298

6-1-1914
8 x 5¼

THE PENNSYLVANIA RAILROAD COMPANY

N. C. RY. P., B. & W. R. R. W. J. & S. R. R.

REPORT OF WORK PERFORMED (MATERIAL AND LABOR) AT TEST RACK, ON TRIPLE VALVES, REMOVED FROM FOREIGN CARS

Initials ______ *Car Number* ______ *Date* ______

Repairman ______ *Shop* ______ *Make and Type* ______

Initials of Road and Date of Last Previous Cleaning ______

Why sent to Test Rack ______

Slide Valve Spring ______ *Emergency Valve Piston* ______

Graduating Valve Spring ______ *Check Case* ______

Graduating Valve Stem ______ *Check Case Gasket* ______

Cylinder Cap Gasket ______ *Check Valve* ______

Emergency Valve ______ *Check Valve Spring* ______

Emergency Valve Brass Seat ______ *Bolts and Nuts* ______

Emergency Valve Rubber Seat ______ *Studs* ______

Repairs could not be made at Test Rack, sent to ______ *Shop,*

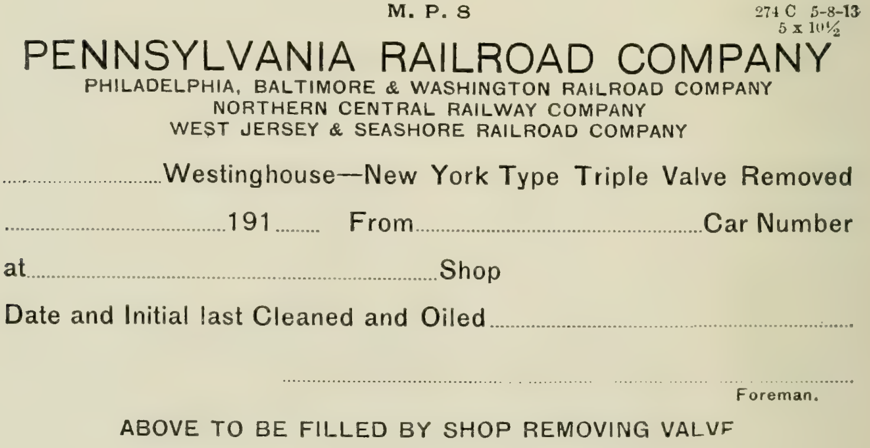
Date ______ *191* , *for* ______ *Repairs.*

______ *Test Rackman.*

the principal defect that necessitates sending the valve to the machine shop. After placing his signature on this form, it is forwarded immediately to the foreman under whose jurisdiction the valve was removed. The latter then prepares a billing repair card covering the test rack repairs, as well as the repairs made at the car, as shown on the shop repair card, form M. P. 124, or yard report, form M. P. 111. This billing repair card is marked with the notation "Bill for repairs to follow." In order that the additional repairs to the triple valve may be obtained, the test rack foreman before forwarding his report, form M. P. 298, to the shop foreman, fills in the information called for at the top of form M. P. 8, which is shown in Illustration No. 6.

This form is inserted in the check valve case and the triple valve forwarded to the designated shop. After the repairs have been completed, the items of repairs, as well as the reasons for same are filled in on form M. P. 8, which is then sent to the foreman holding the original record form M. P. 124 or form M. P. 111, for his informtion in preparing the billing repair card for the additional repairs. In each case the original record, form M. P. 124 or form M. P. 111 is filed with the test rack report, form M. P. 298, and machine shop report, form M. P. 8, when the latter is used. Thus we have a complete record of the entire transaction.

It might be well to state in this connection that each form illustrated herein is supplemented by printed detailed instructions. Likewise, the entire subject of handling repairs to foreign



M. P. 8

274 C 5-8-13
5 x 10½

PENNSYLVANIA RAILROAD COMPANY
PHILADELPHIA, BALTIMORE & WASHINGTON RAILROAD COMPANY
NORTHERN CENTRAL RAILWAY COMPANY
WEST JERSEY & SEASHORE RAILROAD COMPANY

..............................Westinghouse—New York Type Triple Valve Removed

....191........ From..Car Number

at...Shop

Date and Initial last Cleaned and Oiled..

....
Foreman.

ABOVE TO BE FILLED BY SHOP REMOVING VALVE

	REPAIRS MADE	WHY MADE
Triple Valve Body		
Cylinder Bushing		
" Cap		
" " Gasket		
Slide (Exhaust) Valve		
" (") Bushing		
" (") Spring		
Main Piston and Ring		
" " Ring		
Piston Stop		
" Screw		
Graduating Valve		
" Nut		
" Stem		
" Spring		
Emergency Valve		
" " Piston		
" " Seat		
" " Nut		
Check Valve		
" " Spring		
" " Case		
" " Gasket		
" " Cap		
Vent Valve Complete		
" " Piston and Ring		
" " " Ring		
" " Seat		
" " Spring		
Quick Action Valve		
" " Piston		
" " Valve Spring		
" " " Cap		
Rubber Seats		
Strainer		
Bolts and Nuts		
Front Cap Bolt		
Side " "		
Front "		
" " Gasket		
Side Cap		
Cap Screw		
Half Inch Plug		
Exhaust Outlet Plug		

Repaired ....191........

To be sealed in check case.

....

Foreman.

cars and preparation of charges for same is outlined by printed instructions. The particular advantage in issuing printed instructions is that every detail of the subject is presented to each individual employe who has to do with the handling of this work without any possibility of the meaning or intent of the instructions being obscured by change of language or errors in transcribing, which conditions frequently obtain where instructions are issued through the usual channels by letter. Further, the printed instructions can be more readily filed for convenient reference.

After a complete and adequate system of original records, as well as explicit instructions concerning their use has been provided for, there is one more step that must be taken to insure correct charges, viz: to institute frequent checks both of the work being performed and the records of same at all repair points, in order to see that every detail of the instructions is being fully complied with. Such checks are absolutely essential for the reason that no matter how efficient a system of records may be, or how explicit are the instructions, the results desired cannot be obtained if the supervision is neglected.

The most important, or rather the essential features that should be covered by the original records, may be summed up briefly, as follows:

First—Yard records should not be made until after the repairs have been completed and should be prepared and signed by party performing the work.

Second—Shop or repair track records should be checked against the repairs made after the work has been completed.

Third—All material used in connection with labor performed should be itemized separately on shop or repair track records, care being exercised to show the proper description of the material, as required by the M. C. B. Rules.

Fourth—All items of both labor and material that are properly chargeable to car owners under the Rules should be separated from the items that are not chargeable to car owners and suitable designating mark or phrase used to show responsibility.

Fifth—The actual reasons for making the repairs should also be shown on the original records and the use of stereotyped terms prohibited.

After disposing of the question of original records, the preparation of the M. C. B. billing repair cards is a comparatively simple matter. However, there are a number of points in connection with this phase of the work which cannot be overlooked, the most important of which, without doubt, is to see that the information on the billing repair card coincides in every detail with that shown on the original record; and further, the party preparing the billing repair card should not be permitted to draw his own conclusions as to labor performed, amount and kind of material used, or reasons for making the repairs. In other words, if any details of these essential points are not clearly shown on the original record, the latter should be returned to the party preparing same for correction. If this plan is closely adhered to, a great many of the troubles experienced in connection with M. C. B. billing will be eliminated.

After the items of labor and material have been entered upon the billing repair card, the next step to consider is the details of the charges, viz.: weights, quantity and value of material, and labor allowances. It is the practice of some roads to enter these details on the billing repair card at central or division offices; but the practice that is followed on the Pennsylvania Railroad of completing every detail of the charge in the office of the foreman under whose direct charge the repairs are made, has many advantages which may be summarized, as follows:

First—The shop people by being required to complete all details of the charges, necesarily must become close students of the M. C. B. Rules with reference to responsibility for repairs, and particularly with the prices for labor and material, and where the parties preparing the billing repair cards do not have this knowledge, the billing repair card frequently is not intelligently prepared, with the result that it is difficult to determine what the proper material or labor charges should be.

Second—Where the billing repair card is completed in all details in the shop where the work is performed, the record repair card necessarily shows all this information, and exact duplicates of the original can be obtained at any time.

Third—This method results in the training of an efficient corps of M. C. B. clerks over the entire system, from which vacancies in the General Office, where expert M. C. B. men are necessary, can at all times be filled.

FOURTH—The handling of the billing at the General Office is greatly facilitated, as the necessity for returning the cards to the shop for additional information or correction is minimized.

In order to effectively carry out the idea of completing the billing repair card at the shop, it is necessary that the billing repair cards be forwarded daily, direct to the central office where they should be immediately and carefully checked. Any errors that are detected or additional information that may be required should be handled direct with the foreman whose name appears on the billing repair card, instead of such communications following the regular channel, as is provided for by the organization of the road. The advantage of this is obvious, for the reason that, in addition to getting quick results, a great deal of unnecessary work in the office of the Superintendent of Motive Power, Master Mechanic or General Foreman, is eliminated.

A convenient and efficient method of communicating with the shop foreman is by the use of a form similar to that shown in Illustration No. 7.

The clerk who finds an error or insufficient information on a billing repair card indicates, in the space provided, the information desired. This form is filled out in duplicate, the original attached to the billing repair card which is to be returned and the carbon copy held, by the clerk who checks the charge, until a reply is received. It is advisable in the majority of the cases to return the billing repair card to the shop for correction where it would necessitate an erasure of certain information, if the correction were to be made in the central office. However, in cases where it is not objectionable to make a correction on the billing repair card before bill is rendered, the correction may be made at the central office, but the shop should be advised of the correction made by the use of the form referred to, so that they can correct their record repair card and be in a position to avoid similar errors in the future.

A very important factor that contributes greatly to the rapid and accurate checking of charges on the billing repair card is that of itemizing on the extreme right-hand margin the labor allowances for each item of labor appearing on the repair card,

68 C—8-19-1915
8x3½

M. P. 289

THE PENNSYLVANIA RAILROAD COMPANY

P., B. & W. R. R. W. J. & S. R. R.

Altoona, Pa.,________________191___

Mr.________________________

____

Dear Sir:

Please refer to attached Repair Card showing repairs made to________________ car No._______at__________date__________191___, and furnish information asked for below.

____

____

____

RETURN THIS FORM WITH CORRECTED CARD
AND YOUR EXPLANATION SHOWN BELOW

Yours truly,
J. T. WALLIS,
General Supt. Motive Power.

____

____

____

instead of merely showing the total hours labor on the card. This not only facilitates the work in the central office of the billing road, but also enables the car owner to readily see how the total labor charge has been determined, and consequently materially assists in minimizing correspondence between the car owners and the road rendering bill.

There are, of course, other details in connection with this subject that could be commented upon, but those already covered will serve the purpose for which this paper was prepared, that is, to endeavor to present for your consideration the essential points that may be considered necessary to obtain an efficient and reliable system for handling foreign car repairs and the preparation of charges for the work performed.

PRESIDENT: The paper is now open for general discussion.

MR. R. L. KLEINE: This paper is so complete that there is practically no room left for discussion. It traces the repairs of a car from its inception until the bill is rendered and it covers the practice followed on the P. R. R. While this may not be the very best practice for all roads, it is one that has been found conducive to getting the charges correct when the bill is rendered. I have no further remarks to make except to move that the report be received and printed and that the thanks of the Club be extended to Mr. Way for his very valuable paper.

MR. SAM'L. LYNN: Mr. Way has certainly given us a very interesting and instructive paper. In his method of accounting or taking care of repairs he has certainly covered the ground. However, the system of billing varies on different roads. On one road the Car Department may handle the entire proposition, which on other roads the Accounting Department or the Auditing Department handles the billing.

I will say for our road that we are practically following the lines laid down in Mr. Way's paper. There is a little difference in our forms but as stated we have to be governed by the system under which the work is done to some extent and from the paper it is apparent that the P. R. R. Car Department handles the entire billing situation, while on some of the other roads where the work is done by another Department the Car Department is compelled to get their piecework cards and other cards on which charges are made to the Accounting Department as promptly as possible, and in order to facilitate the work you must be governed by local conditions.

After hearing the paper, in my opinion, if the suggestions were followed by all roads it would reduce errors in billing to a minimum.

I wish to second Mr. Kleine's motion.

PRESIDENT: Is there any further discussion? If not, we will be entertained by Mr. Kleine with a moving picture of the "Brake Shoe from its inception to the scrap pile."

SHORTY THE CAR INSPECTOR.

Characters

Foreman of Car Inspectors	Mr. George Anne
Shorty—Car Inspector	Mr. Ellis Staup

SYNOPSIS.

Mr. George Anne, Foreman of Car Inspectors, receives a letter from the General Foreman, telling of the loss in Brake Shoes, due to lack of proper care and improper adjustment and that an improvement will be expected in the future, as evenly worn standard brake shoes ⅝-inch thick will make any run.

Shorty and the Foreman meet at the bulletin board on which the Foreman has posted the letter. Shorty takes exception to the instructions on the ground that he is not taking any chances in the use of questionable shoes. The Foreman seeing that Shorty only lacks confidence, decides to give him a better general knowledge of the use of Brake Shoes.

Together they visit a brake shoe foundry and Shorty is shown how brake shoes are made, how they are tested, and the large amount of new shoes that could be bought with the money represented in waste each year. He is shown the railroad's brake shoe scrap pile and is given a practical lesson in the proper handling of various types of worn shoes.

A run from New York to Pittsburgh is made to determine the loss in weight and thickness on two serviceable shoes that were taken from the scrap pile.

Shorty returns to work and tells the other car inspectors of what he has seen, and profiting by his recent experience is seen to turn a serviceable tapered shoe. Shorty is convinced that an improvement in the use of brake shoes can be made, and after eating his noon lunch, he sleeps, and dreams of brake shoes.

MR. KLEINE: There are three questions that I would especially like to have you consider in connection with these pictures and upon which we would be glad to hear your discussion and opinions. First, "What is the value of motion pictures in supplementing instruction to workmen in the proper performance of their duty?" Second, "Can motion pictures be successfully employed in practical railroad work in the way of instrucing workmen in the proper performance of their duties without supplementing such instruction with special supervision?" And third, "What range of subjects can be covered by motion picture instruction?"

I would ask the privilege of the floor for Mr. Harrod and Mr. Kavanaugh, who have had to do with the preparation of this experiment.

PRESIDENT: We would be very glad to hear from both of these gentlemen.

MR. C. L. HARROD: The subject which you have just seen is one of a series produced by the Test Department of the P. R. R. to determine the value of motion pictures as an educational medium. I think Mr. Kleine has touched the key note of the situation in his three questions and I do not believe I can add anything to that outline.

It might be well however to give you some idea as to what general lines we think the educational moving picture is applicable. We have classified films for R. R. use under three heads, namely technical films, current event films and commercial films. The brake shoe subject would come under the head of commercial films. Technical films would be those which could properly be produced before educational societies, technical schools, and for strictly engineering education. I hardly think such films as we class technical films would be applicable to instruction for employees. As an example, the micro-motion picture film would come under this head, which is, a film doubly exposed to coordinate paper, and to a moving object, in such way that after the motion has been recorded on the film we can replot it on coordinate paper. Current event films would be suitable for the use of Y. M. C. A.'s in the spreading of morals through certain communities, and for other subjects of public interest, such as, athletic work. The commercial film is best expressed in the film we have just shown you. I do not know that there is anything else I could add to the discussion of Mr. Kleine's three questions.

MR. R. D. KAVANAUGH: The brake shoe picture which was just shown, and which was taken by Mr. Harrod, was not intended to cover the entire brake shoe situation on the P. R. R. but to take up certain phases of that work, especially in regard to passenger car work. It is not even an attempt to go fully into that situation, but to bring out some of the points which we thought would be of value to car inspectors and at the same time illustrate a means by which certain educational work could be given to them. We would be glad to have an expression of opinion from many of you on the use of the motion picture for this latter purpose and your criticism of it, if any. It is not perfect and I do not think Mr. Harrod would claim perfection for the picture. It is our first attempt along this line.

PRESIDENT: I hope you will all take part in the discussion. I would like to ask Mr. Turner what he has to say about it.

MR. L. H. TURNER: I have been much impressed with this exhibit made by Mr. Kleine. It never occurred to me that moving pictures could be used to such great advantage, in railroad work.

The saving of $54,000.00 per year on one class of material would warrant any railroad in paying a liberal portion of the sum for the instruction of their men, and I can see no way that they could make the instruction any clearer or more forcible.

I would be in favor of the Club owning an up-to-date moving picture equipment, in order that papers might be better illustrated and our members get a better and clearer idea of what has been said to us. I will take this opportunity of moving a vote of thanks to Mr. Kleine for his trouble and time in giving us this very interesting exhibit.

MR. KLEINE: I might say that I had nothing to do with getting up this motion picture. I have simply presented it to the Club. The main view we wish to take of this picture is what use will it be in railroad work, and whether a picture of that kind will of itself be sufficient instruction to the men without supplementing it by personal supervision. If you must personally supervise in addition to the picture I do not see the value of the picture except for general information.

Mr. Harrod and Mr. Kavanaugh deserve a lot of credit for getting up a picture of this kind. It is simply an illustration of what can be developed for railroad work and what we want particularly is an expression of opinion as to whether the picture itself would be sufficient or whether you must follow it up with the same amount of supervision you are giving the workmen at the present time.

MR. LYNN: Mr. President, I have been very much impressed by the pictures shown and I would like to ask Mr. Kleine if shoes ½-inch thick as shown are actually used between New York and Pittsburgh or on similar long runs. This information is very desirable as we have one or two connections where they insist that we must take shoes off when they get worn down to a certain thickness. The shoes are not worn down to anything like the limits shown in the picture. However, our connections insist that on cars going over the mountains they must be practically new shoes otherwise the shoes will break and they will have all kinds of trouble with worn brake heads, etc., and as the trip between New York and Pittsburgh on the Pennsylvania Railroad would have some heavy grades it would be interesting to know as to whether the thickness of the shoes as shown in the picture are actually used on through trains between New York and Pittsburgh.

In discussing the picture itself it seems to me that it certainly would be an education to inspectors to have pictures as shown here tonight placed before them occasionally. Any set of men who are interested in their work, seeing such an exhibit as has been presented here, would have the subject impressed on their minds and it seems to me that it would be much more impressive than a long talk from their foreman on the subject.

I take the position that the shoes should not be removed until they are practically worn out. However, one of our connecting roads insists that the shoes must be removed, but these shoes do not go into the scrap pile but are placed on cars used on short local runs and they remain there until they are worn out.

The pictures shown tonight have certainly been an education to me and demonstrates in a practical way that with a little care a possible saving may be effected.

MR. KLEINE: I might say that depends entirely on the kind of run—take for instance this picture: A shoe ½-inch in thickness fairly evenly worn will run between New York and Pittsburgh. Of course it largely depends on the number of stops that must be made. These through runs are express runs and do not wear the shoes to anywhere the extent that an accommodation run would wear the shoes between Altoona and Pittsburgh. The main feature of course is to get the shoe evenly worn and to turn that shoe before it gets so bad that it breaks up. The cracking itself does not in any way, as the picture shows clearly, injure the shoe, even though the shoe be bent or cracked, of course it is understood that a steel back shoe is under consideration. It can be put back into shape and placed on the car.

MR. H. H. MAXFIELD: As to Mr. Kleine's first question, I am satisfied that the moving picture as exemplified this evening is of great value in educating employees. I can not imagine a car inspector seeing that picture and not taking a greater interest in his work, if he was fit to work for the railroad at all. Nor can I see how a car inspector after seeing that picture would not have a better idea of the process of manufacturing, and the possibilities of the brake shoe than by any system of verbal instruction he would receive from his foremen or whoever would have supervision over him.

As to the second question—the value of this line of pictures in taking the place of supervision—I do not quite agree with Mr. Kleine when he says that unless you can do away with personal supervision the picture is of little use. We have the supervision today, and yet we have starring us in the face that $30,000 loss in a year simply from this one item of material being scrapped before they should have been. If this moving picture will save 50 or 25 per cent or even a less percentage of that $30,000, and I believe it will, it is certainly a paying proposition to have them in addition to the personal supervision.

You have to supervise and check the men constantly especially the class of labor we are getting in such occupations. In fact we are using more and more of the same class of labor in what we called our skilled occupations. And with it all there is the waste. There is no question but that this type of instruction would supplement that supervision in a most efficient manner. And it has this further advantage that the one man who explains these pictures can talk to fifty or a hundred men at once in the course of an hour, whereas it would take days or weeks to impart anything like that amount of information to those men individually.

As to the third question, I do not think there is any limit to how far you can go. Take this problem that we have in Pittsburgh, the smoke proposition. Mr. Harrod told me just before the meeting about some pictures he took showing smoke conditions at a certain terminal. Put those men who were responsible for that smoke in a room and show them a locomotive terminal where they are operating successfully without making objectionable smoke. Here is a very pointed and practical illustration of a line of instruction where these moving pictures would take care of it to very great advantage. So in the shops. You can do a lot of tricks with these moving pictures, as was done in causing those brake shoes to jump up all around and over "shorty." I do not doubt that you could make a picture in our engine houses showing an improperly applied bolt or key afterwards show that same engine running along the road suddenly flying to pieces because of that nut or key being improperly applied. There is no end to what you can do with it.

MR. KLEINE: I think Mr. Maxfield let the cat out of the bag. It is apparent that he talked with Mr. Harrod before the meeting. I would like to hear from some of the other gentlemen.

MR. MAXFIELD: This was not a put up job at all. I object to the insinuation.

PRESIDENT: May we hear from Mr. Orchard?

MR. CHAS. ORCHARD: It is a little out of my line but I think the great value of these pictures is in suggesting the idea originally to the men that do work. They see in the pictures the very things that concern them in their daily work. As the old saying goes, "seeing is believing" and it is evident from that picture that "Shorty" had to see to be convinced that he was wasting brake shoes. The trip to New York did the business with him and these motion pictures should be convincing to other doubters.

MR. L. RICHARDSON: As mentioned, motion pictures stand or fall on a dollars and cents basis. Actual experience has shown that motion pictures, together with slides, can be exhibited at an expense of not more than $50 or $60 for twelve lectures. This figure covers the rental charge for the machine but does not include the time of the lecturer, as it is felt that this time would be expended in similar efforts if not in this line. With an expense of but $4 or $5 per lecture (and a great many more could have been given with a slightly increased total cost), it would seem that motion pictures would be warranted by even the slightest benefits.

MR. KLEINE: Mr. Turner raised the question of the cost of the motion picture. Mr. Harrod can give us some figures.

MR. HARROD: In the film you have just seen 2500 feet of negative was used at a cost of 4½ cents a foot or $106. 1910 feet of positive was used at a cost of 5 cents a foot, or $95. 600 feet of titles at 5 cents, $30. Service of the camera man, $100 for the time occupied in taking the picture. Salaries of the two actors, who were railroad employees, approximately $100. Cost of the scenario, $50. Miscellaneous and traveling expenses, $50. Making a total of $531.60 for finished films, an average cost of 24.7 cents per foot. The film "removing insulation from the wire," cost $8. The average price of an ordinary film including everything will approximate 25 cents per foot. The average price of technical films which do not take any inside views, requiring artificial lighting, etc., would be approximately 20 cents a foot.

MR. BLACKALL: In seconding the motion that was made I would like to include in it a vote of thanks to Mr. Kleine and his Committee for the very able work they did, and to Mr. Way for his paper, which was very exhaustively worked out on the different points connected with the repairing of cars and the billing for it, and also to Mr. Harrod and Mr. Kavanaugh for the picture.

The motion prevailed by unanimous vote.

There being no further discussion or business.

ON MOTION, Adjourned.

J. B. Anderson
Secretary.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of March, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—Annual Electrical Night.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—Annual Meeting and Election of Officers.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.

SUBJECT—"Heat Treatment of Steel" by G. W. Pressell.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.

SUBJECT—"Train Handling" by Robert Burgess.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—"The Railroad Eight Hour Movement" by W. L. Park.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.

SUBJECT—"Nature's Invisible Forces" by T. H. Ellis.

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.

SUBJECT—Interchange Rules.

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

SUBJECT—Discussion on Interchange Rules.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

In Memoriam

HARRY H. HUNT

DIED DECEMBER 15, 1915

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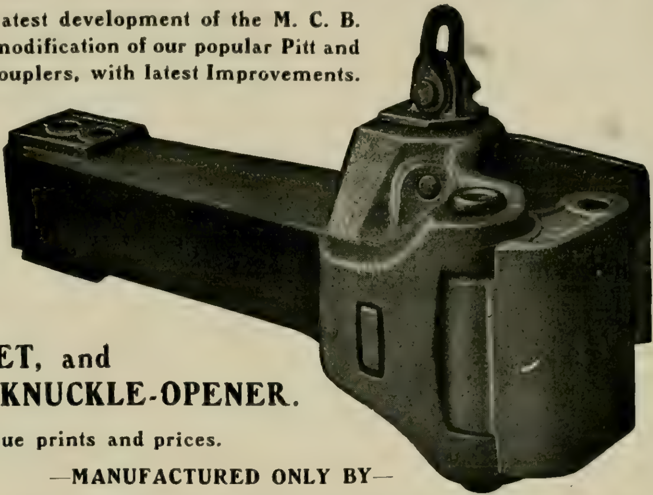

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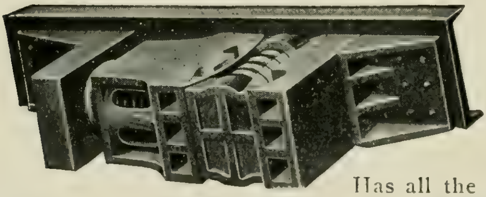

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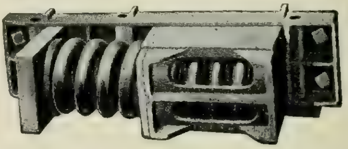

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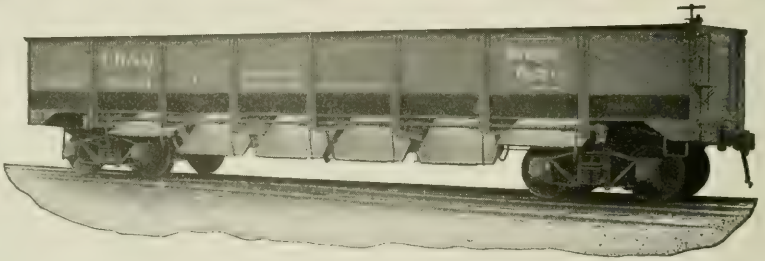

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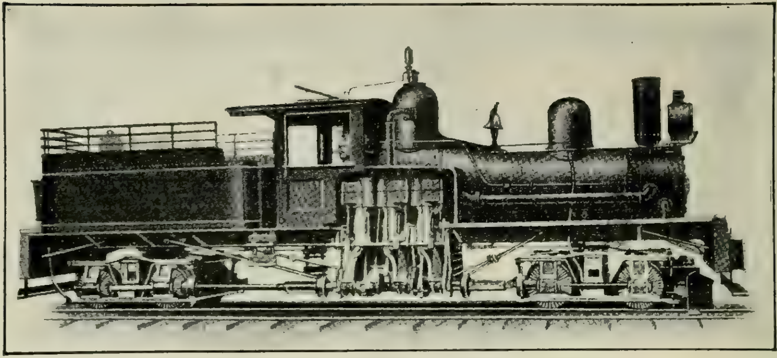

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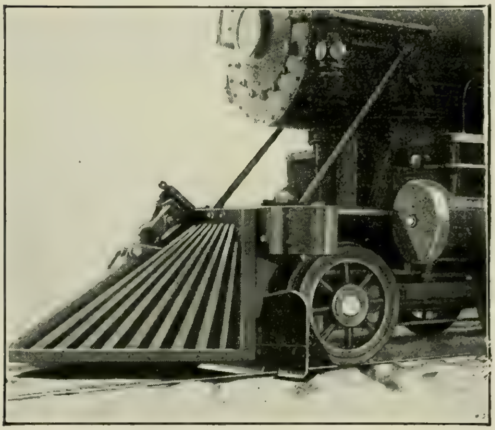

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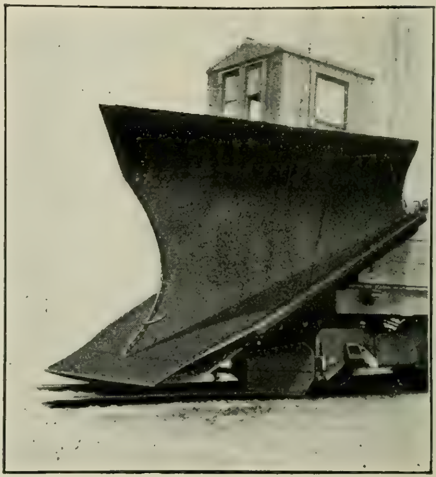

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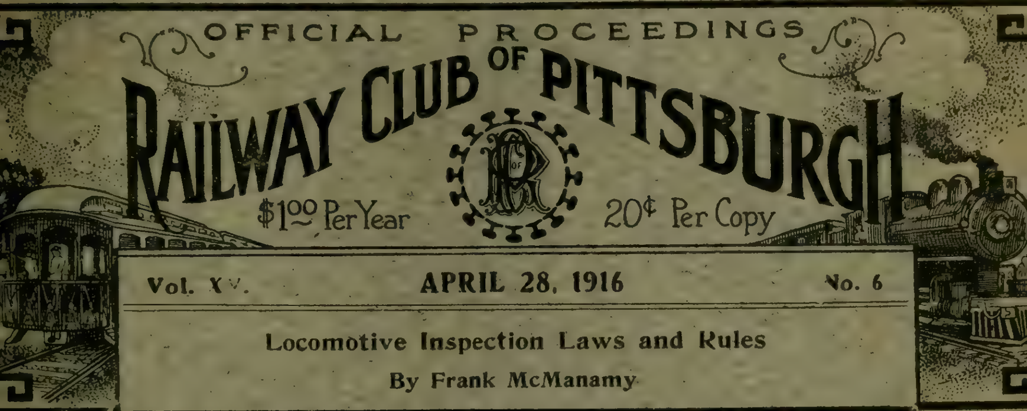

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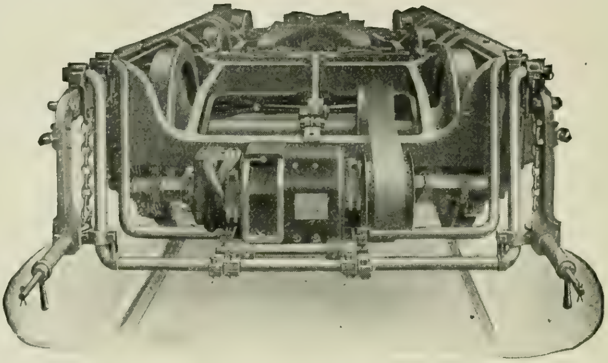

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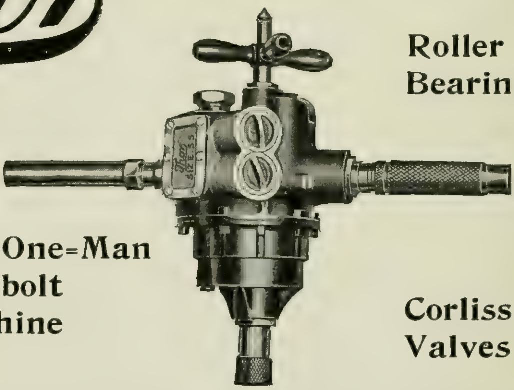

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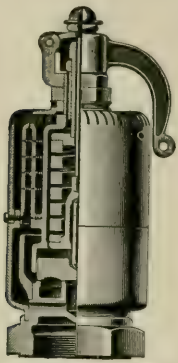

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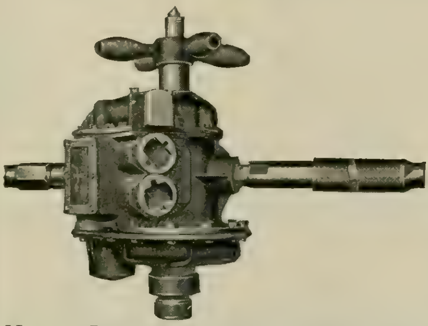

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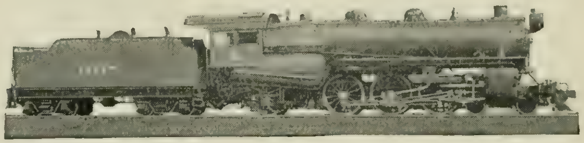

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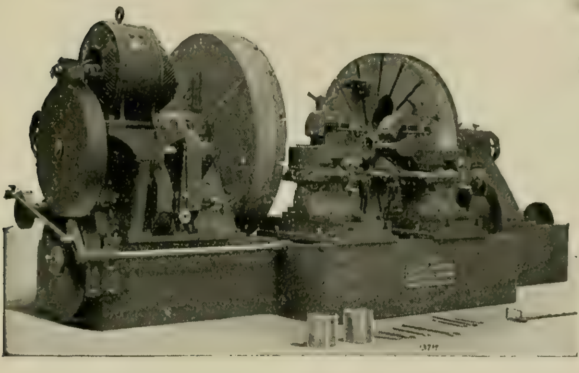

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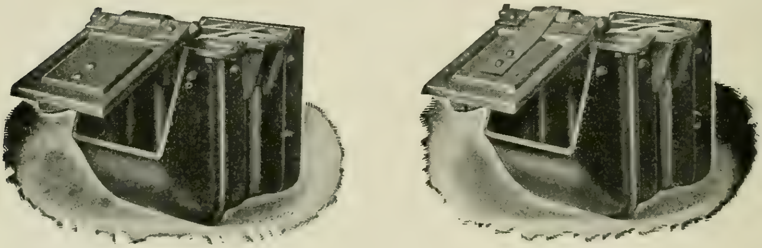

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* Deceased.

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Flemming, H. L.
Frances, W. S.
Fulton, A. M.
Gillespie, W. J.
Glassburn, S. G.
Grewe, H. E.
Hackenberg, J. O.
Haggerty, J. F.
Hague, J. R.
Hammond, H. S.
Hauser, W. M.
Haynes, J. E.
Heckmon, C. J.
Hicks, G. H.
Hill, J. F.
Hilberry, H. H.
Hoffman, C. T.
Holbrook, W. H.
Howe, D. M.
Huchel, W. J.
Hudson, W. L.
Hyndman, F. T.
James, J. H.
Johnson, W. A.
Jungbluth, A.
Kelley, H. D.
Kelly, H. S.
Kinch, L. E.
Kneutter, Wm.
Knickerbocker, A. C.
Koch, Felix
Krahmer, E. F.
Krepps, T. S.
Laughner, C. L.
Laylin, M. H.
Lansbarry, W. B.
Lidstone, F. J.
Lindner, W. C.
Llewelyn, W. R.
Lobez, P. L.
Macfarlane, W. E.
Marshall, W. T.
Mason, Stephen C.

Mathias, D. L.
Maxfield, H. H.
Mitchell, A. G.
Mitchell, John
McDonnell, F. V.
McFeatters, F. R.
McKinstry, C. H.
McNulty, F. M.
McVicar, G. E.
Neel, Tom
Newbury, E. H.
Orchard, Chas.
Page, A.
Patterson, J. E.
Pennypacker, N. W.
Pennington, F. W.
Pie, J. J.
Pratt, I. D.
Ralston, J. A.
Rea, C. S.
Ream, A. H.
Richardson, L.
Richardson, W. P.
Richers, G. J.
Rice, D. S.
Ridley, R. C.
Robbins, F. S.
Rohn, W. B.
Sanderson, W. W.
Schaich, W. L.
Scheck, H. G.
Scott, R. T.
Searles, E. J.
Slutzker, Jos.
Smith, J. B.
Smith, M. A.
Smoot, W. D.
Snyder, Jos.
Snyder, J. W.
Snyder, R.
Spielman, J. A.
Stafford, B. E. D.
Stucki, A.
Stumpf, F. L.
Sturmer, G. W.
Suhrie, N.
Thomas, E.
Thomas, J. H.
Turner, F. M.
Waggoner, R. E.
Warne, J. C.
Watkins, G. H.
Wharton, J. E.
Williamson, J. A.
White, F. L.
Wyke, J. W.

VISITORS.

Abrams, G. H.
Alrert, L. H.
Alexander, L. F.
Ambrose, W. F.
Anderson, J. A.
Auld, J. S.
Barr, J. F.
Bateman, W. H. S.
Beam, W. H.
Belk, C. R.
Bennan, E. J.
Benson, R. W.
Bennett, G.
Beyen, G. J.
Bleasdale, Jas.
Bressler, Danl.
Brown, C. S. Sr.
Burgess, T. S.
Bubnham, Chas. E.
Calvin, A. W.
Campbell, G.
Canby, J. L.
Cartus, W. J.
Church, C. R.
Clark, H.
Coleman, G. H.
Conord, W. K.
Conroy, B.
Conwell, F. E.
Cover, W. C.
Cracroft, J. M.
Crawford, D. F.
Creegan, F. M.
Curran, J. M.

Davis, F. S.
Davis, W. R.
DeBarry, E. G.
Debrick, Joseph
Dewire, E. G.
Dickson, K. B.
Dildine, E. E.
Donaldson, W. E.
Dwyer, C. S.
Ellis, W. L.
Evans, N. G.
Feagler, C.
Folly, R. J.
Friedman, George
Fritchey, F. W.
Fritts, S. L.
Galloway, G. R.
Gilan, C. K.
Giles, A.
Getting, E.
Gorrell, M. B.
Graham, E. A.
Haugh, R. R.
Hammer, W. E.
Harris, R. J.
Heberling, F. H.
Heist, H. C.
Heim, M. J.
Hill, L. C.
Hillhouse, A.
Horton, Joseph
Howe, Jno.
Hughes, R. H.
Hutton, E. B.
Inks, S. W.
Jackson, W. S.
Jester, W.
Jones, G. A.
Jones, J. R.
Kaiser, A.
Kaupman, J. L.
King, S. A. Jr.
Kremser, J. A.
Kroske, J. F.
Leary, J. J.
Lewis, Herbert
Love, G. W.
Mast, H.
Meyer, J. L.
Mikaloff, G. F.
Moran, W. F.
Morris, J. M.
Mumaugh, J. S.
Musgrove, J. H.
McCauley, J. R.
McCowan, Jas.
McGann, J. F.
McIntyre, R. C.
McMenamin, C. G.
McMillian, A. E.
McSweeney, E. J.
McWilliams, F.
Nerzum, W. A.
Oschmann, W. O.
Parfett, J. H.
Powers, E.
Preselor, M.
Quinn, R. S.
Raedel, W. P.
Rankin, T. H.
Reese, O. P.
Richardson, C. C.
Riddell, W. J. Jr.
Rigby, C. A.
Rippey, O. H.
Robison, R.
Rihn, George
Rudd, W. B.
Ryde, H. H.
Schmitzer, L. W.
Schmoll, G. A.
Seely, C. A.
Shaaghnessy, M. A.
Shaffer, Wm.
Sharp, W. A.
Sheridan, T. F.
Siddall, Wm.
Simmons, F. R.
Singer, J. O.
Slater, A. W.
Smith, P. J.
Sowash, F. E.
Spindler, D. G.
Stauch, W. F.
Statler, H. A.
Stillings, Wm.

Stubblefield, D. R.
Thomas, H. M.
Thomas, I. J.
Thom, Wm.
Thurston, H. B.
Touney, D. O.
Watson, J.
Weidlein, L. B.
Weidmeier, L. W.
Wiles, R. D.
Wyberg, E. L.
Young, A. J.

The reading of the minutes was dispensed with, they being in the hands of the printer and about ready for mailing to the members.

The Secretary read the following list of applications for membership:

Batemann, W. H. S., Sales Agent, Parkersburg Iron Co., 822 Commercial Trust Building, Philadelphia, Pa. Recommended by A. Stucki.

Conwell, F. E., Motive Power Inspector, Pennsylvania Lines, 221 North Monroe Avenue, Columbus, O. Recommended by A. Stucki.

Donaldson, W. E., Superintendent Transportation, Carnegie Steel Company, Youngstown, O. Recommended by Chas. Orchard.

Giles, Alfred, Master Mechanic, Carnegie Steel Company, 1823 Main Street, Sharpsburg, Pa. Recommended by F. L. White.

Morris, J. M., Motive Power Inspector, Pennsylvania R. R., 207 Pennsylvania Station, Pittsburgh, Pa. Recommended by George H. Watkins.

Richardson, C. A., Engineer, B. & O. R. R., 127 Johnston Ave., Pittsburgh, Pa. Recommended by D. C. Courtney.

Vallney, M. T., Salesman, Freedom Oil Works Company, 818 Crawford Street, Pittsburgh, Pa. Recommended by C. R. Cassiday.

Widmeier, L. W., Assistant Sales Manager, American Flexible Bolt Company, 50 Church Street, New York, N. Y. Recommended by F. M. McNulty.

PRESIDENT McNULTY: As soon as these names have been approved by the Executive Committee, the gentlemen will, upon payment of dues, become members without further action.

The Secretary announced the death of Mr. Will H. Rowand.

PRESIDENT: An appropriate memorial minute will appear in the next issue of the Proceedings.

If there is no further business, it is my pleasure to introduce to you Mr. Frank McManamy, Chief Inspector of the Division of Locomotive Boiler Inspection, Interstate Commerce Commission, of Washington, D. C., who will present a paper on "Locomotive Inspection Laws and Rules."

LOCOMOTIVE INSPECTION LAWS AND RULES.

By Frank McManamy.

Mr. President and Members of The Railway Club of Pittsburgh:

Your kind invitation to address The Railway Club of Pittsburgh on the locomotive inspection laws and rules was accepted because of the opportunity it affords to discuss those laws and rules with a representative body of railroad men, thereby aiding in a more uniform understanding of them. I feel, however, that this Club is especially favored by having members who took a very active part on behalf of the carriers in the formulation of the locomotive inspection rules, and who therefore are perhaps better qualified than I am to explain their purpose and what they require.

The purpose of the locomotive inspection laws can perhaps be no more clearly expressed than by quoting the title, which is——

> "An Act to promote the safety of employees and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their locomotives with safe and suitable boilers and appurtenances thereto."

Section 1 of the law provides that it shall apply to any common carrier or carriers, its officers, agents and employees, engaged in the transportation of passengers or property by railroad in the District of Columbia, or in any Territory of the United States, or from one State or Territory of the United States or the District of Columbia to any other States or Territory of the United States or the District of Columbia.

Section 2 makes it unlawful for any such carrier to use any locomotive engine propelled by steam power unless the boiler of said locomotive and the appurtenances thereof are in a proper condition and safe to operate in the service to which the same is put.

We have, therefore, in these brief extracts from the title and sections 1 and 2 of the law a general outline of its purpose, to whom it applies, and what it requires. Under date of March 4, 1915, an amendment to the locomotive boiler inspection law, extending its provisions to the entire locomotive and tender and all parts and appurtenances thereof, was enacted by Congress, making a locomotive inspection law out of what was formerly the locomotive boiler inspection.

The method provided by the law for enforcing compliance with its provisions is important. Recognizing the impossibility of 50 Federal Inspectors actually inspecting the 68,000 locomotives in the United States, Congress placed that duty upon the carriers and made them responsible for the inspection, the repair, and the condition of their locomotives, and the duties of the Federal Inspector largely supervisory. To this end, section 6 of the law provides that the first duty of the Federal Inspector shall be "to see that the carriers make inspections in accordance with the rules and regulations established or approved by the Interstate Commerce Commission, and that carriers repair the defects which such inspections disclose before the boiler or boilers, or appurtenances pertaining thereto, are again put in service." It further provides that——

> "Whenever any District Inspector shall in the performance of his duty find any locomotive boiler or apparatus pertaining thereto not conforming to the requirements of the law or the rules and regulations established and approved as hereinbefore stated, he shall notify the carrier in writing that the locomotive is not in serviceable condition, and thereafter such boiler shall not be used until in serviceable condition."

It will thus be seen that the law first requires the carriers to maintain their locomotives in a proper condition and safe to operate in the service in which they are put, and provides that the first duty of the District Inspector shall be to see that this is done, and that carriers make inspections in accordance with the rules. It further provides in cases where these duties are not performed by the carrier that the Inspector shall issue a written order withholding the locomotive in question from service until the requirements are complied with.

In this the locomotive inspection laws differ from other laws governing the condition of railroad equipment; therefore, the method of enforcement has been worked out along somewhat different lines. The Division of Locomotive Inspection has been trying, and with gratifying success, to bring about a reasonable and proper compliance with the requirements of the law and the rules without appealing to the courts, and so far has been able to do so.

Believing that in many instances failure to observe the provisions of the law is in part at least due to failure to fully understand its requirements, it has been our regular practice to take up by letter or in person with railroad officials in charge of equipment defective conditions found to exist, which either were or would lead to violations of the law or the rules, and where the conditions objected to are remedied with reasonable diligence further action has not been taken. It is unfortunately true, however, that in all instances action to remedy defective conditions or to change improper practices has not been prompt or efficient, and in such cases the Inspector has no choice but to serve a written order that the locomotives found in violation of the law or the rules shall be withheld from service until proper repairs have been made, and where necessary we do not hesitate to assign sufficient Inspectors to any road to forcibly bring to the attention of the management the conditions objected to.

The locomotive boiler inspection law was enacted more than five years ago, and numerous explanations of what we believe it requires have been made; therefore, there are no good grounds for any claim that it is not fully understood, and violations thereof must be considered as wilful. The locomotive inspection law is comparatively new, and is so comprehensive that explanations will no doubt be of substantial value in assisting carriers to meet the requirements; therefore, my paper tonight will deal more particularly with it.

First I wish to make clear one point on which we are receiving numerous inquiries, and that is that the locomotive inspection law and rules in no way affect or change any of the requirements of the locomotive boiler inspection law or rules, and we will continue to be diligent in our efforts to see that they are complied with. It is true that the forms of reports for monthly and annual inspections were changed somewhat, a combination form covering the entire locomotive, including the boiler, being adopted, but this was done to avoid the necessity of requiring additional sworn reports, and not for the purpose of modifying in any way the boiler inspection requirements.

While we can not assume the duty of advising carriers in every case of the expiration of periods allowed by the rules for making various tests and inspections, it is not out of place at this time to direct attention to the fact that the five-year period for the removal of lagging from all boilers which were in service on June 30, 1911, expires on June 30, 1916, and that before that time they must have had at least one removal of lagging, and the entire exterior of the boiler thoroughly inspected, as provided by rule 16.

Some of the carriers postponed as long as possible any effort to meet these requirements, and in an effort to catch up with the work are now adopting the practice of simply removing and replacing jacket and lagging when the locomotive is in for the monthly inspection, and so reporting on form No. 1. This does not meet the requirements, and form No. 1 can not properly be used for making such reports. The purpose of requiring a complete removal of the lagging is to permit a thorough inspection of the entire exterior of the boiler, which can only be made while the boiler is under pressure; therefore, hydrostatic test must be applied while the lagging is off, and a report made on form No. 3.

In the preparation of the rules which were approved by the Commission in their order of October 11, 1915, effective January 1, 1916, it was considered advisable to follow as closely as practicable the general plan of the locomotive boiler inspection rules, particularly with respect to making inspections and filing reports by the carriers. The purpose of this was to avoid, so far as consistent with a satisfactory compliance with the requirements, inconvenience and expense to carriers in the matter of making such reports.

In order to avoid a duplication of reports, combination reports (forms Nos. 1 and 3) were prepared, which cover the work required by the locomotive boiler inspection law and rules, and also by the amendment to the law and the rules issued in accordance therewith, and take the place of reports (forms Nos. 1 and 3) previously required; and, in general, these reports should be handled the same as the former ones were.

I shall not attempt in this paper to explain or define each rule, and it should not be necessary, as most of them are specific in their requirements and can scarcely be misunderstood. I will try, however, as a part of our plan to get results without law suits, to make clear those that are somewhat general in their terms, and also any with respect to which numerous questions have been asked.

It will be noted that rule No. 1 of the locomotive inspection rules is identical in its requirements with rule No. 1 of the boiler inspection rules, and makes the railroad company responsible for the general design, construction and maintenance of locomotives and tenders. Rule No. 2 is identical with rule No. 7 of the boiler inspection rules, and makes the officer in charge at each point where inspections are made, responsible for the inspection and repair of all locomotives under his jurisdiction. Rule No. 3 is exactly the same as boiler inspection rule No. 8, defining the meaning of the term "Inspector." And they are intended to accomplish the same general results.

Rule No. 4 of the locomotive inspection rules reads as follows:

> "Each locomotive and tender shall be inspected after each trip, or day's work, and the defects found reported on an approved form to the proper representative of the company. This form shall show the name of the railroad, the initials and number of the locomotive, the place, date, and time of the inspection, the defects found, and the signature of the employee making the inspection. The report shall be approved by the foreman, with proper written explanation made thereon for defects reported which were not repaired before the locomotive is returned to service. The report shall then be filed in the office of the railroad company at the place where the inspection is made."

The general purpose of this rule is to require the present practice of inspecting locomotives daily to be continued, and to avoid, if possible, the necessity of requiring additional sworn reports of inspection.

It is the practice of some carriers to immediately conform to a Federal rule or law that is less rigid than their present system of inspection, apparently overlooking the fact that Government rules are not shop standards, or intended to represent the general condition of equipment, but are minimum requirements, or limits which mark the point at which the Government will take action to bring about necessary improvement in the condition of equipment. In other words, they represent the extreme condition in which the locomotive will be permitted to continue in service.

This being true, the effect of fixing by rule a monthly inspection only would be, in many instances, to have the carriers accept that as the Government standard and neglect inspections between those periods. The law was not intended to relieve carriers from inspections which have by years of experience been found necessary, but to insure the performance of those inspections and such others as may be considered essential to proper maintenance of locomotives. Therefore, rule No. 4, providing for the usual daily inspection in addition to the monthly inspection and report became necessary.

Form No. 2 which is required by rule No. 4 was intended to accomplish two definite purposes: First, to insure an inspection of each locomotive at certain prescribed periods. Second, to require the foreman or officer in charge to know the condition of the locomotive, and to say why defects reported were not repaired before the locomotive is returned to service.

One of the reasons for this is that in many cases it is practically an impossibility when an accident resulting from defective equipment occurs, to fix the responsibility for the defects in question. The officials in charge of the work will often insist that the defect was not properly reported, or not reported at all; therefore, that they should not be held responsible for failure to make repairs. The person whose duty it was to report such defects insists with equal vigor that the defect was properly reported, perhaps had been reported numerous times, but had not been repaired. Failure to find the reports of a defect after an accident has occurred does not always indicate that such reports were not made, because frequently carbon or other copies of such reports are obtainable when the original reports can not be found.

Rule 4, which requires an inspection after each trip or day's work, and a report showing the defects found, with the signature of the employe making the inspection, and requiring that the report shall be approved by the foreman, with proper written explanation made thereon for defects reported which were not repaired before the locomotive is returned to service, will assist in definitely fixing the responsibility for operating defective locomotives. It will also require the foreman to exercise more careful supervision over the work, so that he may properly sign the report. These inspection reports must be kept on file in the offices of the railroad company, where they can be inspected.

Some railroads are starting out with the evident intention of defeating the purpose of this rule. One of the most common methods is to have two reports, one showing everything in good condition, properly approved by the foreman, which is kept on file; another, which may be the usual work book, or a different report, showing the actual defects and the repairs made.

Railroading has, in a spirit of sarcasm perhaps, been described by a railroad man as "the art of placing the responsibility on the other fellow." I do not agree with this definition, or that it particularly applies to railroad men, because I know that men in other lines of work are as proficient in evading responsibility for improper conditions as some railroad men; but we must admit that it pretty accurately describes practices that are too frequently met with.

One illustration of this is the difficulty we are experiencing in getting form No. 2 approved by the foreman, "with proper written explanation made thereon for defects reported which were not repaired before the locomotive is returned to service," as required by the rule. We expected some difficulty in getting the inspections properly made, even though the rule differs but little, if any, from rules which were supposed to be in general use, but we did not expect that it would be more difficult to get the foreman to perform his part of the work than it would be to get proper inspections made.

We were still further surprised to find that the objections of the foremen were not to the approval of the report, as that is a comparatively small matter, but the requirement that "proper written explanation must be made thereon for defects reported which were not repaired" appears in many cases to be out of tram with their ideas of the duties of a foreman, and many of them resent being required to say why defects reported were not repaired.

A few illustrations of what we find when making accident or other investigations will perhaps be of interest, and will show why we are insisting on a reasonable compliance with rule 4 by the foreman. We were advised that an engineman had been seriously injured by failure of knuckle pin in the left side rod. Investigation brought out the fact that the defective condition of rods and boxes, which in all probability caused the failure, had been reported on every trip for more than a month, but the repairs had not been made, neither had the foreman made any notation on the reports showing why. Driver brakes were inoperative, and the defect had been properly reported seven consecutive trips. Other defective conditions had been reported for varying periods, ranging from 10 to 34 days. Of course, I realize that under the circumstances it might be embarrassing to the foreman to put on paper his excuse (there could be no reason) for failing to make repairs.

In another instance we found it necessary to order a passenger locomotive out of service on account of steam leak from cracked cylinder seriously obscuring the enginemen's vision. An investigation showed that this defect had been reported at each end of the division for 30 consecutive days.

On a recent trip I found it necessary to order repairs to a yard locomotive on account of footboard hangers badly bent, footboard broken and shoved under buffer beam, left injector inoperative on account of boiler check leaking, right boiler check leaking badly, piston rod and valve stem packing blowing badly both sides. Upon examining the work reports I found the footboard had been reported three consecutive days, the packing had been reported twelve consecutive days, and boiler checks had been reported 22 consecutive days, with no record of repairs and no reason for failing to make them.

Numerous similar illustrations might be given, but should not be necessary, and in order to forestall the statement frequently made that this must have been on a small railroad where facilities for making repairs were inadequate, will say that all the cases referred to were on roads operating more than 1,000 locomotives.

If I were to be asked what in my opinion is the principal cause of locomotives being operated with defects which are violations of the rules, I would without hesitation say that the one important cause is lack of proper supervision. The average workman in any line of work will follow the standard set for him by, and which is acceptable to, the person in charge of the work; or, in other words, they will give you just what you will take. It avails nothing to fix a high standard by rule, and then day after day on job after job to accept work that is away below the standard thus set. This willingness to accept work that is below the standard, or failure to observe that it is below the standard, has a demoralizing effect on the force, and is the principal cause for poor work being turned out.

Some of the principal requirements in rule 4 about which there appears to be some misunderstanding are covered in the following explanatory circular, which was recently issued:

CIRCULAR NO. 123.

> "In reply to numerous inquiries relative to the inspections after each trip or day's work, as required by rule 4 in the Commission's order of October 11, 1915, and to provide for a uniform compliance with its requirements, the following explanations are given:
>
> In road service, the word 'trip' as used in this rule ordinarily means one way over a division or district. On branch or turn-around runs where one round trip is made in a day, 'trip' will be held to mean 'round trip.'
>
> In suburban, transfer, or short branch line service where more than one round trip is made each day, also in yard service, 'day's work' (instead of 'trip') will apply.
>
> For locomotives which make one or more round trips per day, with one end of the run a shop point, inspections made daily at such point will be accepted as meeting the

> requirements of the rule, even though the day's work is not completed there.
>
> In work-train or other service in which locomotives are tied up at outlying points where repairs can not be made, inspection reports may be sent to the terminal at which the locomotive is cared for.
>
> For double-crewed locomotives in yard service, where crews change in the yard, one inspection and report each 24-hour period will be required. This may be made when the locomotive is taken in for fuel, water or fire-cleaning; where such locomotives do not go to the shop for this, an inspection period must be provided, and the inspection as provided by the rule made once each 24 hours.
>
> The above explanations are not intended to reduce the number of inspections required by the rule, which are minimum requirements."

In this connection it is well to say at this time that the explanation of rule No. 4 shown on page 4 of the explanations of rules issued by the Special Committee on Relations of Railway Operation to Legislation is one with which we can not agree. The explanation reads as follows:

> "Any employee the railroads designate can sign the report instead of the foreman."

This was issued without having been submitted to any representative of the Government, and can not be accepted, because it is contrary to the very purpose of the rule, inasmuch as under it a call-boy, roundhouse foreman's clerk, or any other employee could approve reports for repairs of which he knew absolutely nothing.

We have stated that at large terminals where the roundhouse foreman or general foreman is unable to approve the reports on account of lack of personal knowledge, the approval of the gang foreman or the mechanic in direct charge of the work would be accepted, because of his having personal knowledge that the work had been properly performed; but we will not accept the report approved by some employee of the railroad who does not have such knowledge.

The requirements of rule 4 are identical with the system which has been said to have long been in force on many or practically all important railroads in the country. The instructions shown on the form of report are, in effect, the same as those contained on similar reports which have been in general use. The only difference is that now there is a Federal rule that these inspections be performed and the defects reported, and that the foreman shall say why repairs were not made, while prior to January 1, 1916, it was a rule of the carriers only, and, as was stated by one general manager, "There is a great difference between a Federal rule which must be observed, and the same rule adopted by a railroad company, which may be varied from at pleasure."

Rule No. 4 and form No. 2 simply continue in force what has been said to have long been the general practice with respect to locomotive inspection.

Rule No. 5 can not, and was not intended to, modify or change the act of May 30, 1908, known as the Ash Pan Act, requiring every locomotive to be equipped with an ash pan which can be dumped and emptied or cleaned without the necessity of an employee going under such locomotive. It was intended to, and does, provide that such ash pans shall be securely and properly attached and supported, and that the operating mechanism shall be properly arranged and maintained in a safe and suitable condition for service.

Our inspections have disclosed numerous cases where ash pans are not maintained in accordance with the requirements of the Ash Pan Law, the best evidence of which is the fact that it is comparatively an easy matter to find some man under a locomotive hoeing out the pan, because the devices for cleaning it are inoperative or inefficient.

Rules 6 to 15 cover the inspection and condition of brake and signal equipment, and provide, first, for an inspection after each trip, to see that the brakes are in a safe and suitable condition for service; second, for a service test to show the general condition of the compressors.

One of the points on which the most numerous requests for information have been received, is the method of making an orifice test of an air compressor, and where the fitting containing the orifice disk should be attached. That is a matter on which we are not going to make a positive rule, because the orifice must be attached at some point where it will receive the supply of air from the compressor. The usual method is to attach it to the main reservoir, which is entirely satisfactory to us. If for convenience it is desired to attach it to the brake pipe at the rear of the tender, we will not object, because that is a more severe test than the rules require, inasmuch as the compressor must also supply any brake pipe leakage that may exist.

Another question that has frequently been asked is with respect to paragraph 2 of rule 13, which reads as follows:

> "No part of the foundation brake gear of the locomotive or tender shall be less than $2\frac{1}{2}$ inches above the rails."

We are asked if the words "foundation brake gear" include the brake shoes. Our understanding of this rule is that they do not, and this is supported by the Locomotive Dictionary, which defines foundation brake gear as "The levers, rods, brake beams, etc., by which the piston rod of the brake cylinder is connected to the brake shoes."

Tests of distributing or control valves, reducing valves, triple valves, straight-air double-check valves, dirt collectors, and brake cylinders are also required at regular intervals; and a choice of three methods of recording the date of these tests is given. That is, it may be stenciled on the parts, stamped on metal tags attached thereto, or displayed on a card under glass in the cab of the locomotive.

The rules so far have not required sworn reports of these tests to be filed, but the practice which we find is being followed on some railroads indicates that such a rule may become necessary, as we have found that the practice which has long been too general on repair tracks, of "cleaning" triple valves and brake cylinders on cars by means of a stencil and paint brush, is being adopted for locomotive practice, and dates of testing and clean are being placed in the cab without any work having been performed. In a number of instances the date shown has been one on which the locomotive was not at the terminal at all. This practice if followed will surely result in a change of the rule requiring such reports to be sworn to, thus placing a greater measure of responsibility on the inspector and officer in charge.

Rule 16 covers the condition of cabs, warning signals and sanders, and attempts to provide for a reasonable view of the track and signals for the enginemen. One of the requirements which seems to be not generally understood is that relating to clear vision windows. It may be, perhaps, that the description of this window is not as complete as it might be.

The term, however, indicates what is desired, and should in itself prevent the application of some of the windows which were designed to be used under this rule. I refer particularly to the type of window supposed to meet this requirement which has a wooden frame from 1 to 2½ inches in width across the front cab window directly in the line of enginemen's vision. This surely could not under any circumstances be called a "clear vision" window.

What is desired is not an obstruction, but something that will give an unobstructed view of the track and signals during stormy weather. On the best types the glass is securely attached to a frame at the top and sides only, leaving no obstruction across the center of the window at the bottom of the opening. Such a window will not obstruct the enginemen's vision in any way when closed, and in stormy weather if opened slightly it will give the enginemen an unobstructed view of track and signals, which can not be obtained with his head out of the side cab window in a severe snow or rain storm.

Misunderstanding with respect to the periods within which the various tests and inspections required by the locomotive inspection rules must be performed has caused some confusion, and is resulting in some instances in carriers making an extra effort to make tests which might properly, and perhaps more satisfactorily, be made at a regular inspection period, and in other instances failing to make tests which should be made at inspection periods, and which will cause additional expense and delay to equipment when they are required later.

To make this point clear, will say that beginning January 1, 1916, which is the date the locomotive inspection rules became effective, all tests or inspections required by them should be made within the prescribed periods. That is, inspections required monthly should be made within the first month; inspections required quarterly should be made within three months; and inspections required annually should be made within the year. This permits inspections required under the locomotive inspection rules to be made at the time the boiler inspections are made, and avoids the necessity of holding locomotives especially for this inspection.

When the locomotive is held for inspection, all of the work should be done; otherwise, it is sure to cause inconvenience later. To illustrate: Hydrostatic test of main reservoirs is required at least once each year. The intent of this clearly was that this test should be made when the hydrostatic test is applied to the boiler, but we are receiving annual reports from many roads showing hydrostatic test applied to the boiler, but none to the main reservoir. This is not only a failure to comply with the intent of the rule, but is sure to result in an Inspector ordering the locomotive held to have this work done, and it may occur at a time which will be very inconvenient.

It is important when applying hydrostatic test to main reservoirs to provide a vent at the top of the reservoir to permit the air to escape. Failure to do this has already resulted in one accident, due to the air which was trapped and compressed in the reservoir as it was filled with water for the test.

There has been some question as to the proper answer to item 6 on form No. 1, with reference to the condition of draw gear between locomotive and tender. Rule 22 provides in part that——

> "The pins and drawbar shall be removed and carefully examined for defects not less frequently than once in three months."

This has been interpreted by some to mean that the condition need be shown but once in three months, but it simply provides a particular inspection for the pins and drawbar which should be made. The first sentence of the rule requires that——

> "The draw gear between the locomotive and tender, together with the pins and fastenings, shall be maintained in safe and suitable condition for service."

This means not only the drawbar and pins, but also the safety bars or chains, with their fastenings; therefore, they must be known to be in good condition, and so reported on each monthly report in answer to item 6. When the drawbar and pins are removed to make the special inspection required by the rule, that should also be indicated on the report.

The remaining rules follow, with some slight modifications, the standard practice recommended by the Master Mechanics' Association, which should be so well understood that explanations are not necessary.

Before, closing I think I should refer to the results of four years enforcement of the locomotive boiler inspection law, as shown by our fourth annual report:

NUMBER OF ACCIDENTS, NUMBER KILLED, AND NUMBER INJURED, WITH PERCENTAGE OF DECREASE:

	1915	1914	1913	1912
Number of accidents	424	555	820	856
Decrease from previous year, per cent	23.6	32.3	4.2	....
Decrease from 1912 (per cent)	50.5	....	....	....
Number killed	13	23	36	91
Decrease from previous year, per cent.	43.5	36.1	60.4	....
Decrease from 1912 (per cent)	85.7	....	....	....
Number injured	467	614	911	1005
Decrease from previous year, per cent.	24	32.6	9.3	....
Decrease from 1912 (per cent)......	53.5	....	....	....

Carefully investigating and classifying every accident, and pointing out the cause, has done more perhaps to reduce their number than any other one thing. It gives everyone who reads our reports detailed information with respect to the chief causes of accidents, thus making it possible to guard against them.

That this was not otherwise available is forcibly illustrated by the opinions generally held and freely expressed when the locomotive inspection rules were under consideration, that accidents resulting from failure of locomotive machinery were not so frequent or so serious as boiler accidents. Our records so far indicate that this opinion is no nearer correct than some that were expressed about the boiler inspection act when it was passed.

Up to date, accidents reported to us under the locomotive inspection rules have killed 8 and injured 131 persons, and we know that, perhaps on account of failure to fully understand the requirements, all were not reported.

Among the most serious as well as the most frequent classes of accidents are draw gear failures, allowing locomotive and tender to separate, 16 accidents of this character, resulting in two killed and 15 injured, having been reported. Twenty-nine persons were injured by defective reversing gear. Broken spring hangers have caused 2 deaths and 6 injuries. Cylinder-head failures have killed 1 and injured 6.

A general classification of accidents due to failure of parts of the locomotive and tender covered by the amended law has not been made, but is sure to be surprising. It is our purpose to investigate them carefully and classify them, giving the cause. After a year or two of such work sufficient data will be available to enable not only the representatives of the Government, but of the railroads, to systematically and effectively labor to remove the causes, and thereby reduce the number.

When I said the law had brought about the reduction in the number of accidents shown in our fourth annual report I meant just that, and not that the Government Inspectors had done it. It is true we are enforcing the law to the best of our ability, but credit must be given to the railroad officials and employees for the cooperation we have received from many of them. If that spirit of cooperation is to continue, all of the problems incident to the inauguration of the locomotive inspection law and rules can be worked out without friction, and with equally good results. Without it, inconvenience, friction, and generally unsatisfactory results are sure to come.

In the prevention of accidents, as in other matters, it is team work that counts, and the representatives of the Government will do their share.

DISCUSSION.

PRESIDENT: The subject is now open for general discussion. This in an interesting one, especially to railroad men, and we hope you will all respond promptly in the discussion. I will ask Mr. Seeley to open the discussion.

MR. C. A. SEELEY: I thank you for the opportunity. At the same time, not being a railroad man I do not know that I could say anything that would be of especial value to you.

The most practical benefit to the railroad men following this paper might be along the line of the discussion of a similar paper in Chicago, where questions were asked as to interpretations which were not yet thoroughly understood. There would be a particularly favorable opportunity at this time for any man who does not yet understand what is to be done, to ask Mr. McNanamy what he ought to do.

PRESIDENT: Mr. George W. Sturmer, Special Representative of the General Manager of the B. & O. R. R., may we hear from you.

MR. GEORGE W. STURMER: I have listened with great interest to the paper, and when I look around on this body of intelligence sitting here and nobody ready to discuss the paper, I am rather inclined to believe that everybody is satisfied with the present laws pertaining to locomotive inspection on railroads. There is only one thing I would want to say, that if every railroad man, no matter what his vocation will live up to the law as laid down by the government and by the various managements for which they work, there can be only good results obtained. There is no question in my mind that these laws have brought about a great revolution in railroad life and when we look back over the history of railroading years ago and look around here and see some of those old friends with whom I railroaded thirty-five years ago, they must certainly confess that it has revolutionized matters in railroad life. There is no man that ever ran a locomotive but knows the danger of a boiler. That is the most important factor today in railroad life, the boiler. I am certainly convinced that the paper read tonight has made a deep impression upon everybody present, and the only way to bring about good results is the hearty cooperation of employee and employer.

We have today a subject that confronts the world in railroad life and that is the weakness of man. The control of the train running at the rate of sixty or seventy miles an hour, and the various ideas and troubles that every man has to contend with in the locomotive must produce new ideas in railroad life, and still there is enough to be performed and the inventive genius is at liberty today to make itself renowned to the world by producing something that will bring about less rear end collisions and going past the red. That is the weakness today that confronts railroad life, and whenever the man is in a position to produce a mechanical invention that will bring results and stop rear end collisions and head end collisions, that man will be the forerunner of mechanical ideas in the future.

PRESIDENT: Mr. J. B. Haynes, Master Mechanic of the Montour Railroad. We would like to hear from you.

MR. J. B. HAYNES: Mr. President, I can not say anything that would add to the paper. It was so clear that every one ought to understand it.

PRESIDENT: Mr. H. G. Scheck, Road Foreman of Engines, P. R. R.

MR. H. G. SCHECK: In the absence of any questions, I think every one here understands the law. The real question is will we all follow it out? In making up the reports required there are times when an engineer comes in and they are after his engine—in fact they are after it before it gets in—and it might be possible that some of those reports when you ask the foreman to attest them he will balk. But as the law requires it to be done, the only thing to do is to hold the engine and do it and let the transportation department kick.

PRESIDENT: Mr. D. S. Rice, Boiler Shop Foreman of P. R. R.

MR. D. S. RICE: I have been very much interested in the paper read tonight, and I do not feel that I can add anything to it.

PRESIDENT: Mr. John Bleasdale, Master Mechanic, B. & O. R. R.

MR. JOHN BLEASDALE: I did not hear all of the paper, but what I did hear was very interesting. It touched upon a subject very close to railroading and it is a matter of very great importance to all of us.

PRESIDENT: Mr. L. C. Bihler, of the Carnegie Steel Company.

MR. L. C. BIHLER: I am not a mechanical man but I will talk a little on this subject. I have been very much interested in the paper. I think the speaker struck the key note in a very admirable address, and The Railway Club of Pittsburgh is to be congratulated upon getting him to come here tonight, because this law has only been in force four months, and some things which were not understood, he has made clear and simple. It would pay every one here to read Mr. McManamy's paper over again, when he gets the printed proceedings.

While there have been no questions asked as yet, I think I am right in saying that every man here is a booster for "safety first." This is the day and age of safety and safety produces more efficiency and we are all in favor of efficiency as well as safety.

When I got the notice of the meeting the subject of locomotive inspection appealed to me as something that would attract our mechanical people. The company with which I am connected has a number of terminal railroads which operate a good many standard gauge engines and we have a number of such engines which do more or less switching, and it has always been our aim to handle all these standard gauge engines on the same basis of efficiency and upkeep that the government requires of railroads. So we invited those mechanical men of ours here tonight. We have probably two dozen or more present and several have already decided to become members and get the benefit of this practical knowledge which The Railway Club of Pittsburgh dispenses. I hope the others who have not yet applied will in time become members. And as this propoganda is of so much value to mechanical people they will probably all want to join and come to every meeting.

PRESIDENT: Mr. Herbert Lewis, Locomotive Inspector, Interstate Commerce Commission.

MR. HERERT LEWIS: Being directly associated with the Department of Locomotive Inspection and directly answerable to Mr. McManamy the chief of the department, I can only say that as an Inspector of the Pittsburgh district I am simply trying to carry out in practice that which Mr. McManamy's paper has conveyed to you. And it is only fair that I should say that I have received from approximately 95 per cent of the railroad fraternity of this territory hearty cooperation in bringing about the desired result.

PRESIDENT: Mr. G. A. Schmoll, District Superintendent of Motive Power, B. & O. R. R.

MR. G. A. SCHMOLL: I believe that this a good opportunity to not only express our appreciation of the very able paper presented but advantage should also be taken of this opportune time to obtain information on points which are not clear or understood.

If I am not mistaken the speaker said that the engine must be maintained in a condition suitable for the service to which it is assigned, and I would like to bring up the question as to whether we should be expected to maintain an engine in switching service in practically the same condition as one assigned to passenger or road service. It is generally conceded that a locomotive assigned to passenger service is kept in better condition than one used in freight and switching service. In my opinion, the law does not allow enough latitude in maintaining the locomotives assigned to the service first mentioned, and we should be allowed additional limits to those now in force in the case of freight or passenger locomotives.

MR. McMANAMY: In reply to Mr. Schmoll I will say that he is probably in the position of a great many others here, he has not read the rule very carefully. The rules do provide for a difference in condition of locomotives used in yard service and locomotives used in road service in every important particular. They are a little more liberal for those used in yard service than those in road service. We do not recognize any reason for great difference in the condition of passenger locomotives and freight locomotives, because the freight locomotives make the same time that passenger locomotives do when their tonnage will permit it. The only reason they do not make 30 to 50 or 60 miles an hour on certain important trains is because their trains are too heavy, and when they get the light train they make the same time. And at the same speed an accident will be equally serious for the men on the locomotive.

For yard locomotives there are differences provided for in the rules in the matter of condition of machinery, tire wear, lost motion in guides and cross heads, lost motion in rods, and things of that kind. And we believe that the rules were intended to be a guide to what is meant by the law when it says the locomotive must be in proper condition and safe to operate in the service to which they are put. The rules were necessary so that every inspector in the employ of the government would follow as closely as possible the same line.

The rules do not give any additional authority to the Inspector. The law gives that. The rules simply provide a guide for all inspectors to follow, making the inspection service as nearly uniform as it is possible to get the work of any fifty men under the varying conditions of railway operation. The law not only confers upon the inspector the authority, but makes it his duty to take action when any locomotive is not in proper condition and safe to operate. And the rules are his guide to follow, so that there will be uniformity in the work of the various inspectors. On some railroads we have as high as fourteen inspectors who each inspect a part of their equipment. If we did not have rules we might have fourteen different methods of inspection on that railroad, which would be undesirable.

But we believe the rules clearly set forth the limits for road locomotives and for switching locomotives. We did not believe at the time the rules were prepared that it was desirable to make any distinction between freight and passenger service, although it is the general practice of the companies to maintain their passenger power in better condition than their freight power. We have fixed a minimum. When they have reached that they should be repaired.

MR. J. G. CODE: I do not want to ask any questions, but the mention of human weakness reminded me of the importance of doing a particular thing at a particular time, in regular order, thus forming a habit. And in this way the features of these laws ought to be a very great help in eliminating the element of human weakness through our railroad service. There is always a disposition among all men—and quite common among railroad men—to do their own business in their own way, and to resent any interference. But as we go along we see more clearly the value of these rules which requires a particular action taken at regular intervals on a particular thing. I think that is one of the greatest elements in the elimination of human weakness from our action, the formation of right and regular habits of doing the necessary things.

PRESIDENT: May we hear from Mr. Thurston, Locomotive Inspector in the Pittsburgh District for the Interstate Commerce Commission?

MR. THURSTON: Mr. President, I do not believe I have anything to add.

MR. A. G. MITCHELL: As an operating official I am not so much interested in the detail part of this paper as in the spirit manifested by the speaker. What impressed me most was that these gentlemen, employed by the government as Inspectors, express a desire to cooperate with the railroad officials in seeing that the law is carried out. They are not mere spies, trying to find out all the little difficulties we have and to punish us for errors, but they are trying to correct faulty conditions through care and proper reports so that the safety of the boilers may be improved. I wish to bespeak for them from every railway official the most hearty cooperation.

MR. G. C. EMMONS: I have recently joined the Club and I do not know very much about it but I have one or two questions which I would like to ask. One of them is what is the relation of the test pressure to the operating pressure employed?

MR. McMANAMY: The only pressure test for air equipment is the hydrostatic test on the main reservoir. Rule 8 reads as follows: Every main reservoir before being put into service and at least once each twelve months thereafter shall be subjected to a hydrostatic pressure of not less than 25 per cent above the maximum allowed air pressure.

MR. EMMONS: Does that 25 per cent above maximum also apply to boilers?

MR. McMANAMY: Yes, sir. The hydrostatic test pressure for boilers is 25 per cent above the allowed steam pressure.

MR. EMMONS: In some parts of the country it becomes necessary to treat boiler water with soda ash or some similar chemical. In the use of soda ash or other sodium salts, the concentration of the sodium salts causes foaming. I have had some experience with that in commercial plants but I do not know what would be considered the limiting concentration of sodium salts in boilers in locomotive operation.

MR. McMANAMY: That can not be fixed by rule. The treating of water in any locality must be governed by the character of the water. Soda ash or any other feed water treatment can be used to excess and in such cases it is apt to cause accident. The method of using soda ash has a great deal to do with its effect. In case they have a laborer who may or may not know what he is putting in the tank, but who has instructions to put in a certain size pail full each time the locomotive is on the table, that method is not usually very satisfactory or successful. The same is true of other treatment of boiler feed water, if it is not done scientifically and properly it may be a dangerous proposition rather than a safeguard. But that can only be determined by the character of the water treated and it should be done after chemical analysis of the water to see what is required for an exact treatment which makes the water as nearly suitable for boiler purposes as it is possible to make that water.

MR. EMMONS: You do not limit then the degree of concentration of sodium salts in the boiler?

MR. McMANAMY: We have found it a proposition that I do not believe can be handled by rule to say what treatment shall be given to each of the boiler waters used in the United States. We have got to consider this question. It is comparatively easy to make rules to govern one division of a railroad. It is not such a difficult proposition to make rules to govern the whole railroad. It is quite a different proposition to make a rule which will be applicable and suitable to all the railroads in the United States under the varying conditions of water, fuel and service. Therefore we have not attempted to go into that.

MR. F. R. McFEATTERS: I do not have anything to say on this subject, but we have listened to a very interesting and instructive paper on a subject that has not been altogether clear to all of us heretofore. We have I think the largest attendance we have ever had. There about 300 here. I move that we extend a rising vote of thanks to Mr. McManamy for his very able paper.

PRESIDENT: Before the motion is put to vote, is there anything you wish to add in closing the discussion, Mr. McManamy?

MR. McMANAMY: There are some of the remarks which, while not direct questions, might yet profitably have a little explanation. The gentleman who spoke of engines not being held for repairs came pretty near hitting the nail on the head. There is a great deal of that done. I presume there are a number of men here who occupy the position of foremen and they may have thought that what I said about foremen was a pretty severe criticism. It was only intended to help the foreman. We want the foreman to shoulder his own load, and when he has got that he has usually got his tonnage and we do not want him to cary anybody else's load. That is why rule 4 provides for the foreman saying why repairs are not made. If they will not let him hold the engine and he attempts to say the repairs were made—he is shouldering some other fellow's load and he can not carry it. If he hasn't got material or if he hasn't got the men or if his appropriation is exhausted or if for any other reason beyond his control the repairs reported are not made, the foreman is shouldering a burden that does not belong to him if he attempts to carry it. That is why I attempted to make it particularly clear that the foreman should carry his own load and nobody else's. That is why the provision was made in the rules for the foreman to say why these repairs were not made. Now I know enough about the railroad service to know—having done nothing else all my life except work for railroads and the government—that there might be rare instances where the foreman would not dare say just why he did not make repairs, and in such case as that he can protect himself by making the one responsible carry his own burden.

One of the gentlemen spoke of efficiency, and that is an important question in railroad operation. There are two sides to the efficiency operation. The efficiency engineers are no doubt amply able and do probably properly take care of the one side, the output or the quantity of the product. I am going to tell you that one of the purposes of this law was because the government (that is the people) saw the necessity of taking an interest in the other side of the efficiency question and insisting on quality as well as quantity of the product. There may be efficiency rules which pay a bonus or otherwise reward men for quality of the work or there may be piece work schedules which take into consideration the quality of the work and give some allowance for good work above that which is paid for work which may be just acceptable, but I have never heard of it. That is the side of the question that the government is interested in. The question of output is one for the carriers to handle, and for the efficiency experts who are timing the various operations.

Do not think from this that I am antagonistic to efficiency work. I admire it. But we want to make the efficiency work complete and cover both sides of the question, and we have got a force that is going to to do what it can along the lines I have just spoken of.

Now in making the rules for the inspection it was not the purpose of the government to set forth untried standards and require things that nobody ever had done. Those who have been as many years in the railroad service as many of the men I see here know that there are a great many things in connection with railroad work which some one has had to say must be done. There are many safety appliances which some one has had to say must be adopted and used. And nobody but the government has that control over the railroads, and it has obtained that control only by a considerable effort which to my knowledge has extended over the past 25 years.

We have spoken of safety first. I have been interested in that for many years. That is really the foundation of our work. Twenty-five years ago as an employee I helped what I could in a very humble way to get legislation which required the adoption of some of the present safety appliance standards. And that work has been going on ever since. Safety first should be given character and not be used simply for advertising purposes. Do not understand me that I think it is always so used, but I know and the men here know that it is sometimes so used. And those are the places where we desire to see an improvement made.

Now with regard to cooperation I want to say to you that it has been the purpose and the desire of the Interstate Commerce Commission and all its employees ever since I have been in the service of the Commission—which is pretty nearly ten years—to cooperate in every way possible with the railroads to bring about certain results that the people demanded and were entitled to. If suits have been filed and penalties collected it was because no other action would bring about the desired result.

I do not think I have anything more to say that would be of interest. I appreciate the opportunity to talk to a club composed of representative railroad men because I find that we can get results in that way many times that it would take months of work to get in some other way. If we can bring about the desired improvement and compliance with the requirements of the law in working together harmoniously it will be much better and more pleasant for all. Each one of the inspectors is a practical railroad man. In their work they meet with the best men that are working on the different railroads. They gather a lot of valuable information and they have no trade secrets. We are perfectly willing to pass on to the next man we meet any good idea we may pick up. But you will find each one of these ideas leading to a certain end, that is to improve the condition of the equipment and make for safety all the time. I thank you, gentlemen.

The motion for a rising vote of thanks was carried unanimously.

There being no further business.

ON MOTION, ADJOURNED.

J. B. Anderson
Secretary.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of April, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—"Passenger Car Sanitation," by Thos. R. Crowder.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—"The Railways and Preparedness," by J. A. Droege.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.

SUBJECT—"The Railways of India," by S. J. Sarjant.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.

SUBJECT—"Efficiency and the Supply Department," by H. C. Pearce.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—"Economic Value of East St. Louis to the St. Louis Industrial District," by T. Anbuchou.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.

SUBJECT—(unknown)

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.

SUBJECT—(No meeting).

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

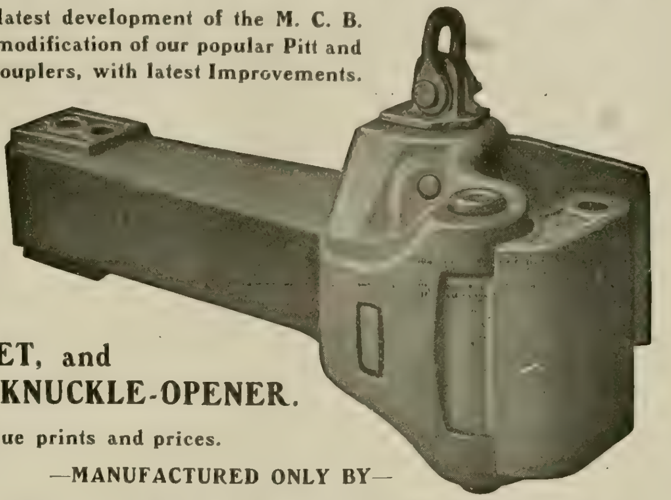
SUBJECT—"Locomotive Inspection—Laws and Rules," by Frank McManamy.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

In Memoriam

WILL. H. ROWAND

DIED APRIL 15, 1916



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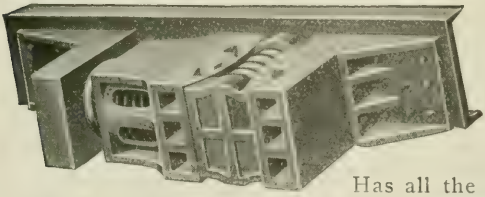

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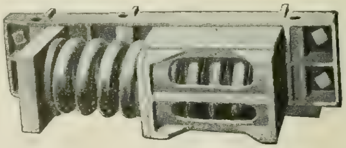

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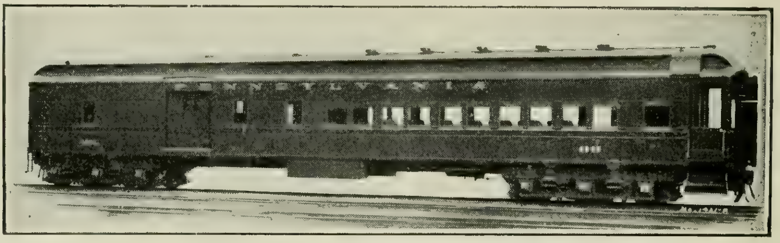

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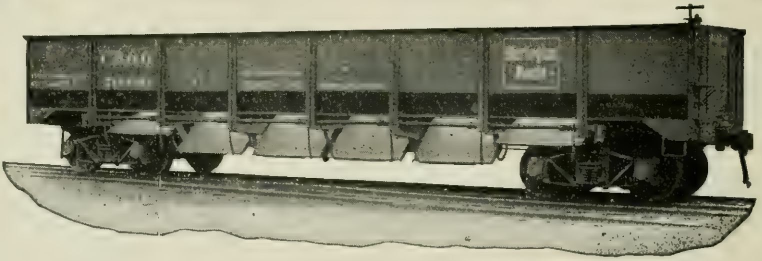

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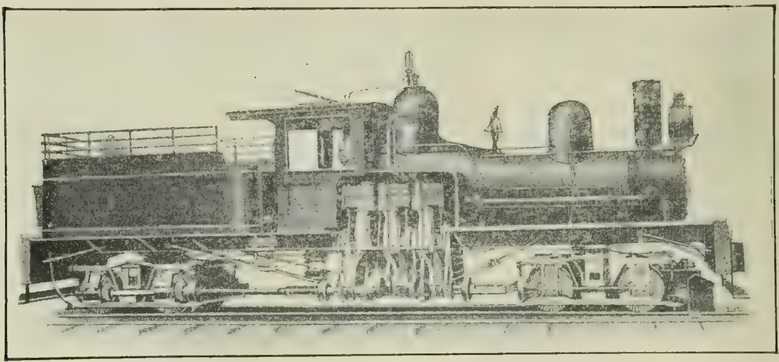

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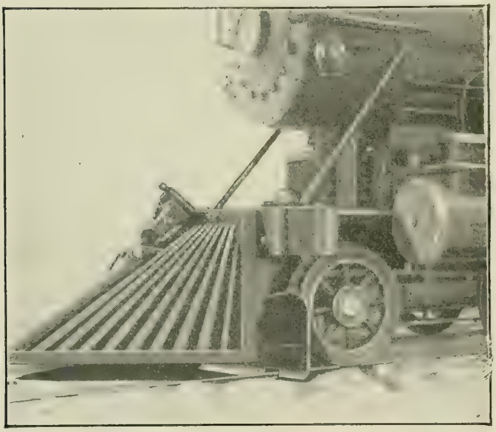

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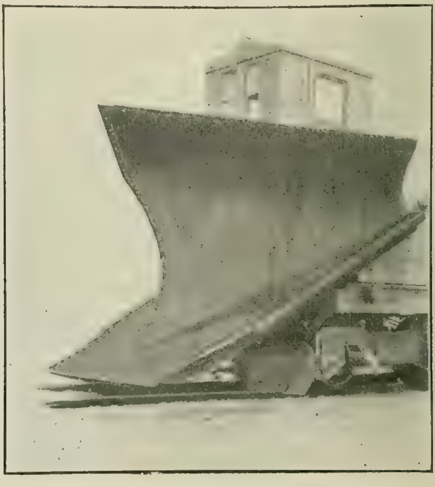

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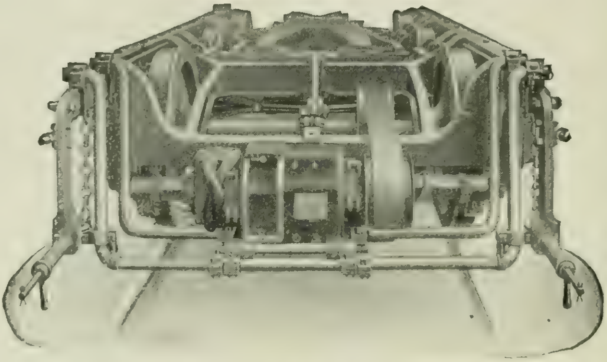

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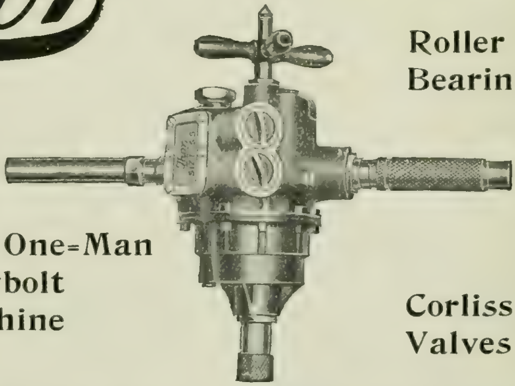

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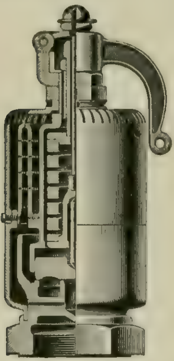

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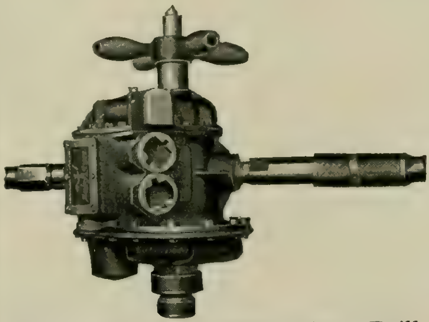

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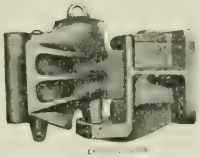

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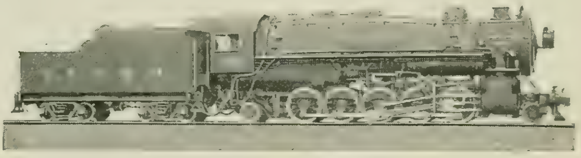

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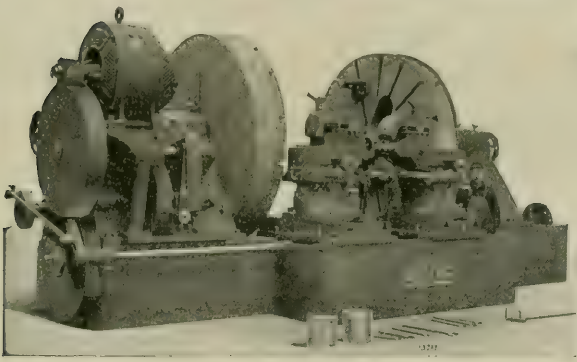

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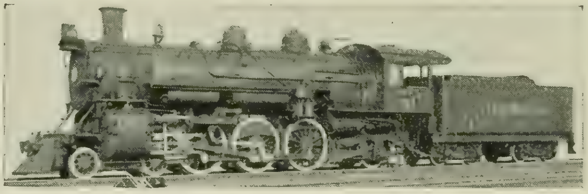

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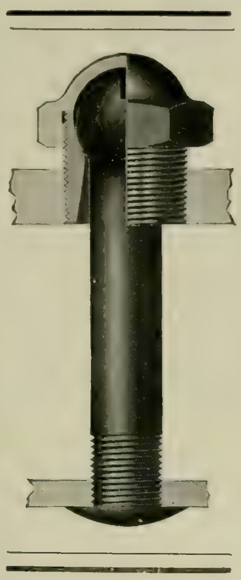

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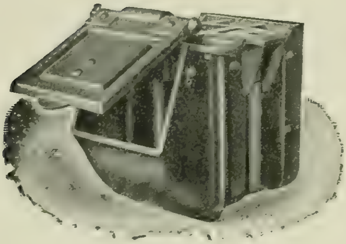

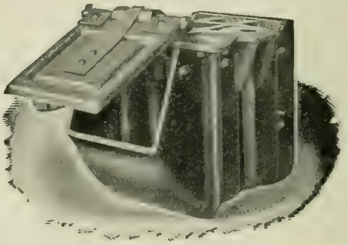

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New York, N. Y.

WALTER V. TURNER,
Asst. Manager, W. A. B. Co.,
Wilmerding, Pa.

L. C. BIHLER,
Traffic Manager, Carnegie Steel Co.,
Pittsburgh, Pa.

Membership Committee
D. M. HOWE,
Manager, Jos. Dixon Crucible Co.,
Pittsburgh, Pa.

A. STUCKI,
Engineer,
Pittsburgh, Pa.

CHAS. A. LINDSTROM,
Asst. to President, Pressed Steel Car Co.,
Pittsburgh, Pa.

R. L. KLEINE,
Chief Car Inspector, P. R. R.,
Altoona, Pa.

C. O. DAMBACH,
Supt. W. P. T. R. R.,
Pittsburgh, Pa.

FRANK J. LANAHAN,
President, Fort Pitt Malleable Iron Co.,
Pittsburgh, Pa.

HARRY HOWE,
Insp'r. Castings, Pressed Steel Car Co.,
McKees Rocks, Pa.

Entertainment Committee
STEPHEN C. MASON,
Secy., The McConway & Torley Co.,
Pittsburgh, Pa.

R. H. BLACKALL,
Railway Supplies,
Pittsburgh, Pa.

D. H. AMSBARY,
Dist. Manager, Dearborn Chemical Co.,
Pittsburgh, Pa.

Past President

J. H. McCONNELL	October, 1901, to October, 1903.
L. H. TURNER	November, 1903, to October, 1905.
F. H. STARK	November, 1905, to October, 1907.
* H. W. WATTS	November, 1907, to April, 1908.
D. J. REDDING	November, 1908, to October, 1910.
F. R. McFEATTERS	November, 1910, to October, 1912.
A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING.
MAY 26, 1916.

The meeting was called to order at the Monongahela House, Pittsburgh, Pa., at 8 o'clock, P. M., with President McNulty in the chair.

The following gentlemen registered:

MEMBERS.

Allison, John
Amsbary, D. H.
Anderson, A. E.
Anderson, J. B.
Babcock, F. H.
Barth, J. W.
Battinhouse, J.
Berg, K.
Berghane, A. L.
Bond, W. W.
Bosley, N. D.
Brandt, W. L.
Brewer, W. A.
Buechner, W. A.
Buffington, W. P.
Burket, C. W.
Calvin, A. W.
Chester, C. J.
Cline, W. A.
Code, J. G.
Conwell, F. E.
Copeland, T. T.
Courtney, D. C.
Cunningham, R. I.
Dalton, C. R.
Deem, G. M.
Doty, W. H.
Dudley, S. W.
Eckstein, J. E.
Eichenlaub, W. C.
Elmer, Wm.
Elsey, W. R.
Emery, E.
Endsley, Louis E.
Evans, E.
Farquhar, L. C.
Ferren, R. O.
Fettinger, H. O.
Fields, A. C.
Frank, L. W.
Frazier, E. L. Jr.
Fulton, A. M.
Graham, R.
Grieve, R. E.
Geddes, J. R.
Gies, G. E.
Guay, J. W.
Harsch, A. M.
Haynes, J. E.
Hicks, Geo. H.
Hoffman, C. T.
Hoffstot, H. P.
Holbrook, W. H.
Howe, D. M.
Howe, Harry
Huchel, Wm. J.
Huchel, H. G.
Hudson, W. L.
Huff, Geo. F. Jr.
Johnson, I. S.
Kelly, H. D.
Kinch, L. E.
Knox, Wm. J.
Kneutter, Wm.
Koch, H. J.
Kummer, Jos. H.
Lanahan, Frank J.
Lanahan, J. S.
Laughner, C. L.
Laylin, M. H.
Lehr, H. W.
Lidstone, F. J.
Lindner, W. C.
Lindstrom, C. A.
Llewelyn, W. R.
Lobez, P. L.

Long, R. M.
Loughridge, H. W.
Low, J. R.
Lowe, W. D.
Marcus, M.
Mason, Stephen C.
Maxfield, H. H.
Millar, C. W.
Mitchell, John Jr.
Miyasaki, Y.
McCandless, Geo. W.
McCauley, Wm.
McCollum, G. C.
McDonnell, F. V.
McKinstry, C. H.
McNulty, F. M.
Neel, Tom
Newbury, E. H.
Orchard, Chas.
Painter, Jos.
Porter, H. V.
Pratt, I. D.
Pennepacker, N. W.
Pennington, F. W.
Rea, C. S.
Redding, D. J.
Reymer, C. H.
Richardson, C. A.
Richardson, L.
Rohn, W. B.
Rose, A. J.
Schaff, A. J.
Schaffer, F.
Schaich, W. L.
Schultz, G. H.
Searles, E. J.
Sleeman, Wm. C.
Slutzker, Jos.
Smith, J. H.
Spielman, J. A.
Stucki, A.
Suckfield, G. A.
Sullivan, W. H.
Swope, B. M.
Turner, Walter V.
Wagner, E. A.
Walther, G. C.
Watkins, G. H.
Way, L. A.
Wharton, J. E.
Wilder, H. W.
Williams, A. G.
Williamson, J. A.
Wyke, J. W.

VISITORS.

Anderson, H. A.
Beegel, F. W.
Boiselle, R.
Boyd, Jas. K.
Burson, H. A.
Burton, T. L.
Carrall, P. J.
Cattell, L. E.
Connolly, R. D.
Coulter, F. C.
Cook, Oscar I.
Costello, L. J.
Cralley, J. T.
Creamer, F. F.
Crittenden, P. L.
Davis, Jas. J.
Dierker, C. J.
Durborow, H. V.
Fallon, B. P.
Flynn, T. A.
Geisler, Jos. J.
Glass, J. M.
Goodfellow, C. M.
Hartman, G. H.
Hays, H. E.
Henry, J. A.
Henry, J. W.
Hill, J. C.
Hopkins, G. A.
Howat, C. W.
Johnson, J. E.
Kerr, Wm.
Kindle, W. F.
Kirkpatrick, H. F.
Koch, C. S.
Landell, J. A. B.

Laurent, C. F.
Leech, J. O.
Lenhart, J. M.
Lloyd, D. M.
Lloyduiller, J.
Long, J. H.
Lowery, Jos.
Maddocks, T. B.
Miller, R. E.
Montgomery, H. A.
Moran, J. P.
McAdams, T. J.
McGaughey, C. M.
McWilliams, I. M.
Neele, J. F.
Nevill, W. E.
Nicholson, P. B.
Nicolas, C. E.
Osterburg, I. J.
Patton, R. J.
Pease, B. H.
Phillips, W. H.
Porter, E. M.
Redding, R. D.
Reese, O. F.
Roberts, S. S.
Ryde, H. H.
Schaffint, W. E.
Sgaffer, F. G.
Shiring, C. R.
Shirk, A. R.
Shoop, G. S.
Snyeer, P. H.
Steigerw t, R. W.
Stern, K. G.
Straw, E. F.
Turner, W. S.
Wallace, W. B.
Weston, A. H.
White, H. W.
Winters, G. H.
Wiskeman, E. C.
Yarnall, J.
Young, C. D.

The Roll Call was dispensed with, the attendance being recorded on the registration cards.

The reading of the minutes of the April meeting was dispensed with.

The Secretary read the following applications for membership:

Bean, Wm. H., Inspector, Locomotive Department, Carnegie Steel Co., 305 Third Avenue, Homestead, Pa. Recommended by John Mitchell, Jr.

Oschmann, Wm. O., Chief Engineer, A. & S. S. Ry., Tenth & Muriel Streets, S. S., Pittsburgh, Pa. Recommended by F. M. Turner.

PRESIDENT McNULTY: As soon as these names have been approved by the Executive Committee, and upon the payment of dues, the gentlemen will become members of the Club without further action.

SECRETARY ANDERSON: By direction of the President I announce the appointment of the following Nominating Committee, who will report at the September meeting on the nominations of officers to serve for the ensuing year commencing November next:

D. M. Howe, *Chairman*
D. J. Redding
F. H. Stark

PRESIDENT: If there is no further business, I take pleasure in introducing to you Mr. C. D. Young, Engineer of Tests, Pennsylvania Railroad, Altoona, Pa., who will read a paper on "The Activities of a Railroad Test Department," illustrated by lantern slides.

THE ACTIVITIES OF A RAILROAD TEST DEPARTMENT

By C. D. Young,

Engineer of Tests, Pennsylvania Railroad, Altoona, Pa.

In a recent issue from the Bureau of Information of the Pennsylvania Railroad, the advantages of a Test Department are aptly summarized as follows:

> "It costs half a million dollars or so to run the Pennsylvania Railroad's Test Department a year, but the management regards the outlay as one of the Company's best paying investments. Every dollar spent for tests comes back, with interest many times compounded, in accidents averted and in the lengthened life of engines, cars, tracks, and structures. The Test Department exists for the purpose of promoting in the highest possible degree, the safety of passengers and employes and the utility and durability of everything used in the operation of the railroad. This, in the end, is the truest economy."

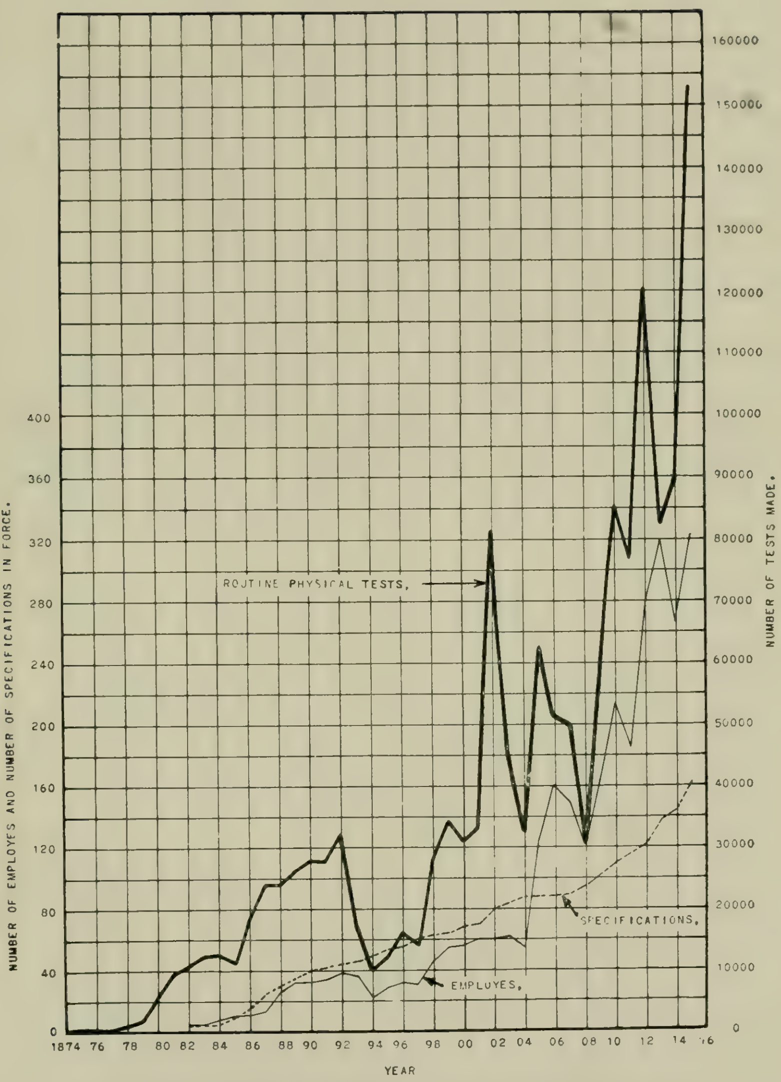
It is with the thought of telling you something of the aims of this department of the Pennsylvania Railroad and of the splendid facilities with which it has been provided, that I come before you tonight.

Our work has contact with almost all activities of the Railroad, but is more intimately associated with the motive power department than with others, and as showing what has been accomplished, we are very gratified to find a reflection of our achievements in the annual report of the railroad for 1915, where a decrease in the operating expenses is attributed to the fuel saved by increased locomotive economy. This has been brought about by the use of certain devices upon the locomotive, as well as by the success of the Mechanical Engineer in designing locomotives particularly suitable for the work which they are called upon to perform. In a review recently published and bearing upon this point, I quote the following:

> "It is seldom that the saving made by a particular mechanical device is relatively large enough to deserve mention in the annual report of the Pennsylvania Railroad. This year, however, a large part of the saving made in transportation expenses is attributable to more effective work of locomotives in both freight and passenger service as the result, on the one hand, of the equipment of locomotives with superheaters and, on the other, of the marked success which has been met with in obtaining locomotives designed for exactly the work which they are called upon to perform."
>
> "The economies which have been made by the introduction of the superheater and by the tests which are being carried on by the motive power department each contain material for extensive discussion; but the point that may without over-emphasis be made here is that the success of these two factors bulks large enough to be reflected in the final aggregate figures for the Pennsylvania Railroad's showing for the year."

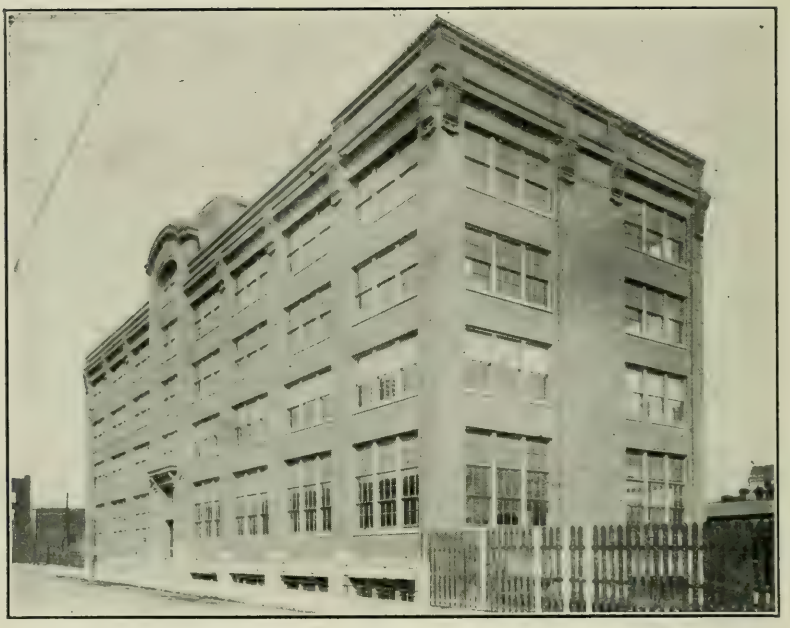
Through the work of our Locomotive Testing Plant, information has been disseminated bearing upon the design of the locomotive and its operation and thus indirectly bringing about the results mentioned.

It is now 42 years since this department for the testing of materials had its small beginning,—the first department of its kind, to the speaker's knowledge, on an American Railroad or on any railroad,—and its rapid and continual growth is shown on Diagram, Fig. 1. For the past 18 months the department has been located in the new laboratory building, a reproduction of which is shown in Fig. 2. This building has 41,000 square feet of floor area in 50 rooms divided into physical, electrical, chemical and bacteriological laboratories, each with its acces-



Growth of the Department of Inspection and Tests.

Fig. 1.



Physical and Chemical Laboratory of Pennsylvania Railroad.
Fig. 2.

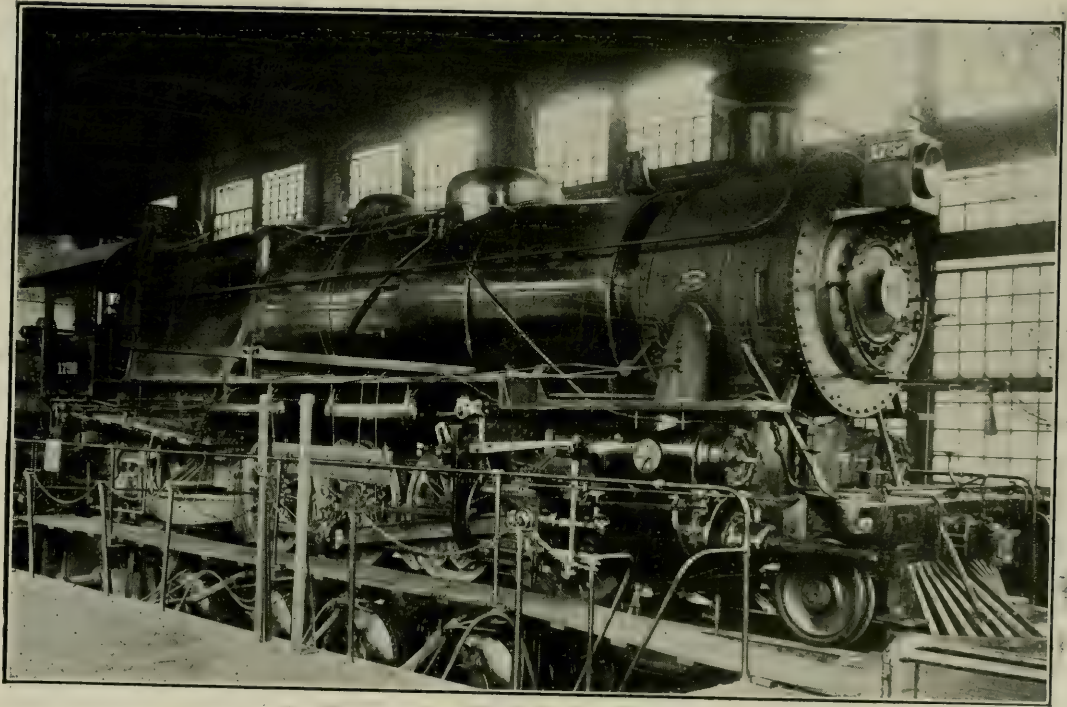
sories; and, located in separate buildings, are the Locomotive Testing Plant, an interior view of which is shown in Fig. 3, and the Brake Shoe Testing Plant, an interior view of which is shown in Fig. 4, and the Manufacturing Laboratory. In addition to these, the road equipment of the department consists of a dynamometer car and a chemical laboratory car.

Physical Laboratory.

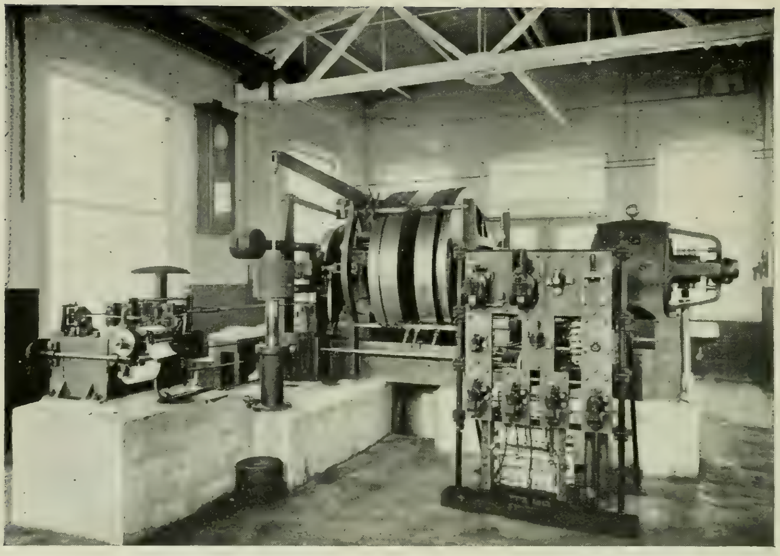
The equipment for physical tests consists of six tension and compression testing machines, one of which has a capacity of one million pounds.

Among the other machines and apparatus that compose the equipment of this Physical Laboratory, there are the following:

One vibratory endurance spring testing machine of seventy-five thousand pounds capacity,—two drop testing machines, one having a drop of forty-three feet for use on axles and couplers,—two vibratory staybolt testing machines and six testing machines for rubber.



Locomotive Testing Plant.
Fig. 3.



BRAKE SHOE TESTING LABORATORY.
Recording Mechanism and Motor Control Board.
Fig. 4.

The air brake hose and miscellaneous laboratory handles the work of specification tests of samples representing 600,000 pieces of air brake hose per year. In this laboratory, tests are made also of steam and hydraulic gauges, gauge glasses for boilers and lubricators, and hand lantern globes. One of the principal divisions of this laboratory is devoted to the heat treatment of metals and operated in conjunction with this work is a metallographic laboratory with full equipment for preparing the specimens for microscopic examination. Another division is devoted to the determination of the heat insulating qualities of materials used for passenger and refrigerator car lining and for boiler and steam pipe lagging.

Electrical Laboratory.

The number of incandescent lamps required for use on the entire System is about one million per year. In order to supervise the purchase of this material, we have equipment for lamp testing consisting of four photometers and a 1000 lamp test rack with transformers, batteries and potential regulators. Within

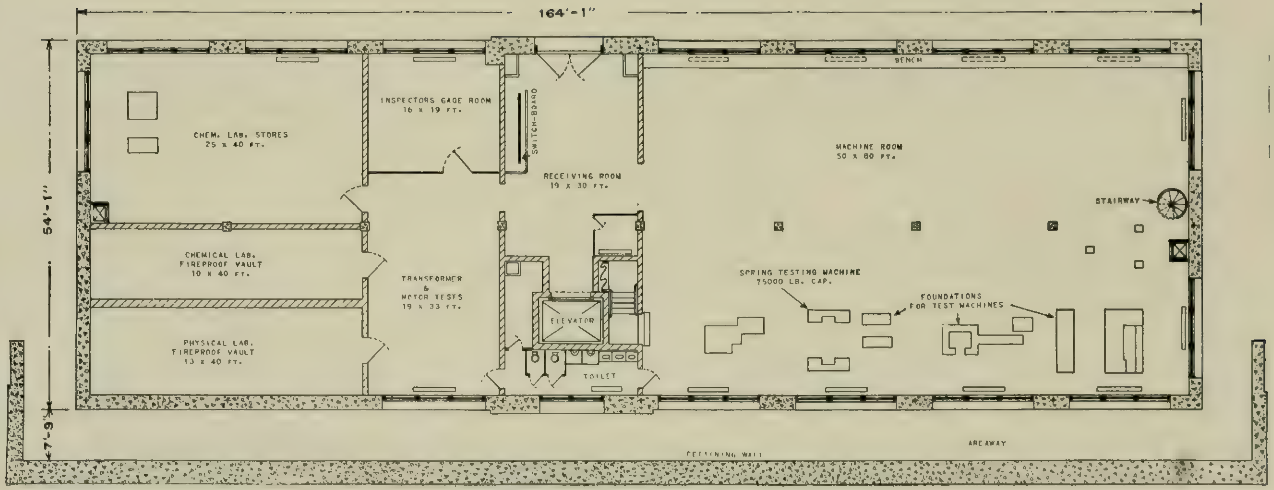


Fig. 5.—Basement Plan.

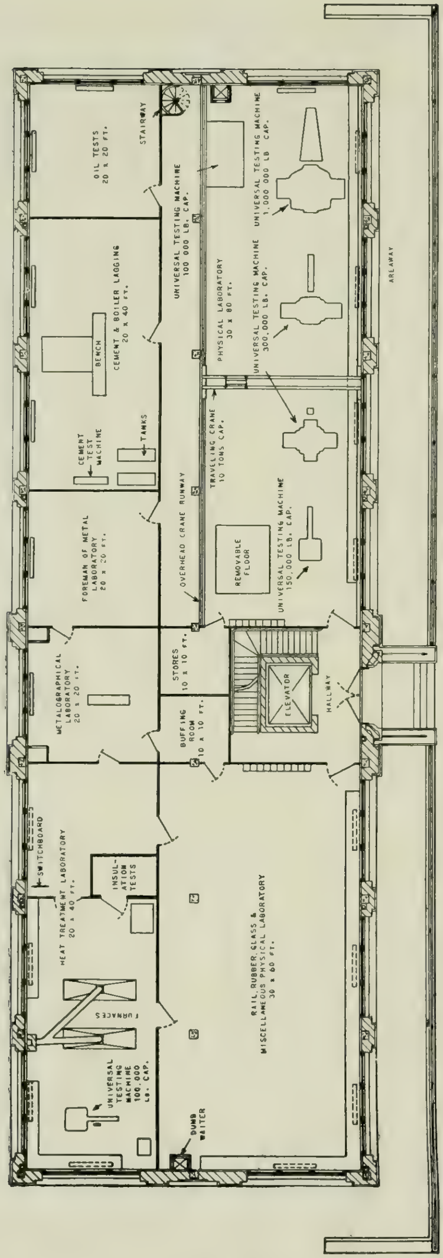

OIL TESTS 20 x 20 FT.
STAIRWAY
UNIVERSAL TESTING MACHINE 100 000 LB. CAP.
UNIVERSAL TESTING MACHINE 1,000 000 LB. CAP.
CEMENT & BOILER LAGGING 20 x 40 FT.
BENCH
PHYSICAL LABORATORY 30 x 80 FT.
UNIVERSAL TESTING MACHINE 300,000 LB. CAP.
AREAWAY
CEMENT TEST MACHINE
TANKS
TRAVELLING CRANE 10 TONS CAP.
OVERHEAD CRANE RUNWAY
FOREMAN OF METAL LABORATORY 20 x 20 FT.
REMOVABLE FLOOR
UNIVERSAL TESTING MACHINE 150,000 LB. CAP.
METALOGRAPHICAL LABORATORY 20 x 20 FT.
STORES 10 x 10 FT.
BUFFING ROOM 10 x 10 FT.
ELEVATOR
HALLWAY
SWITCHBOARD
HEAT TREATMENT LABORATORY 20 x 40 FT.
INSUL-ATION TESTS
FURNACES
RAIL, RUBBER, GLASS & MISCELLANEOUS PHYSICAL LABORATORY 30 x 60 FT.
UNIVERSAL TESTING MACHINE 100,000 LB. CAP.
DUMB WAITER

Fig. 6.—First-Floor Plan.

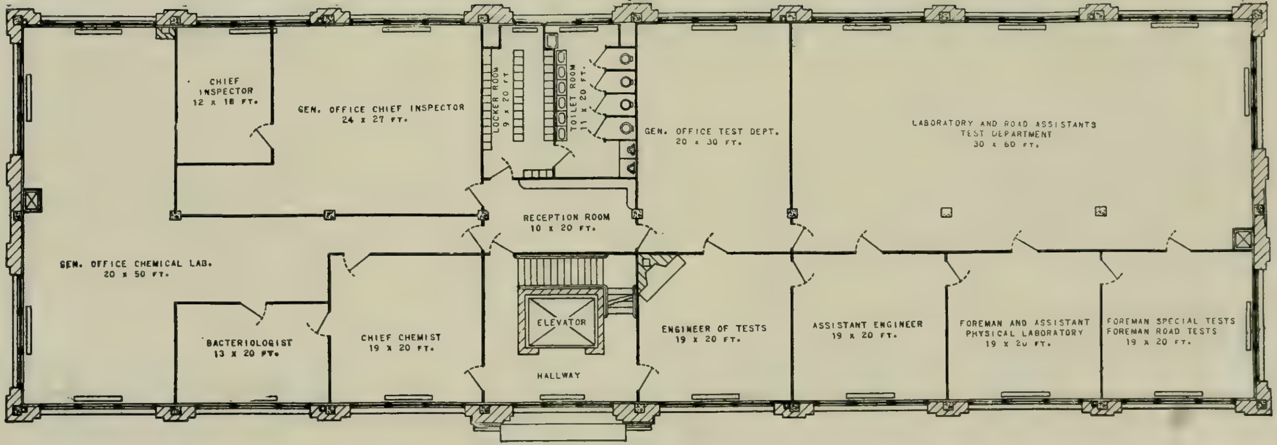


Fig. 7.—Second-Floor Plan.

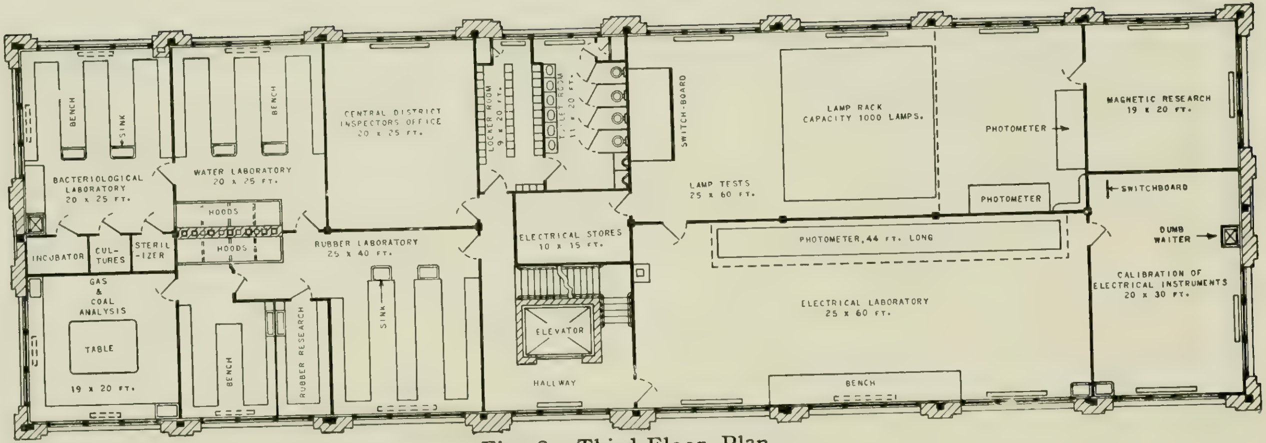

BENCH
SINK
BACTERIOLOGICAL LABORATORY 20 x 25 FT.
INCUBATOR
CUL-TURES
STERIL-IZER
GAS & COAL ANALYSIS
TABLE
19 x 20 FT.
BENCH
WATER LABORATORY 20 x 25 FT.
HOODS
HOODS
BENCH
RUBBER RESEARCH
RUBBER LABORATORY 25 x 40 FT.
SINK
CENTRAL DISTRICT INSPECTORS OFFICE 20 x 25 FT.
LOCKER ROOM 9 x 20 FT.
TOILET ROOM 11 x 20 FT.
ELECTRICAL STORES 10 x 15 FT.
ELEVATOR
HALLWAY
SWITCH-BOARD
LAMP TESTS 25 x 60 FT.
LAMP RACK CAPACITY 1000 LAMPS.
PHOTOMETER, 44 FT. LONG
ELECTRICAL LABORATORY 25 x 60 FT.
BENCH
PHOTOMETER
PHOTOMETER
MAGNETIC RESEARCH 19 x 20 FT.
SWITCHBOARD
DUMB WAITER
CALIBRATION OF ELECTRICAL INSTRUMENTS 20 x 30 FT.

Fig. 8.—Third-Floor Plan.

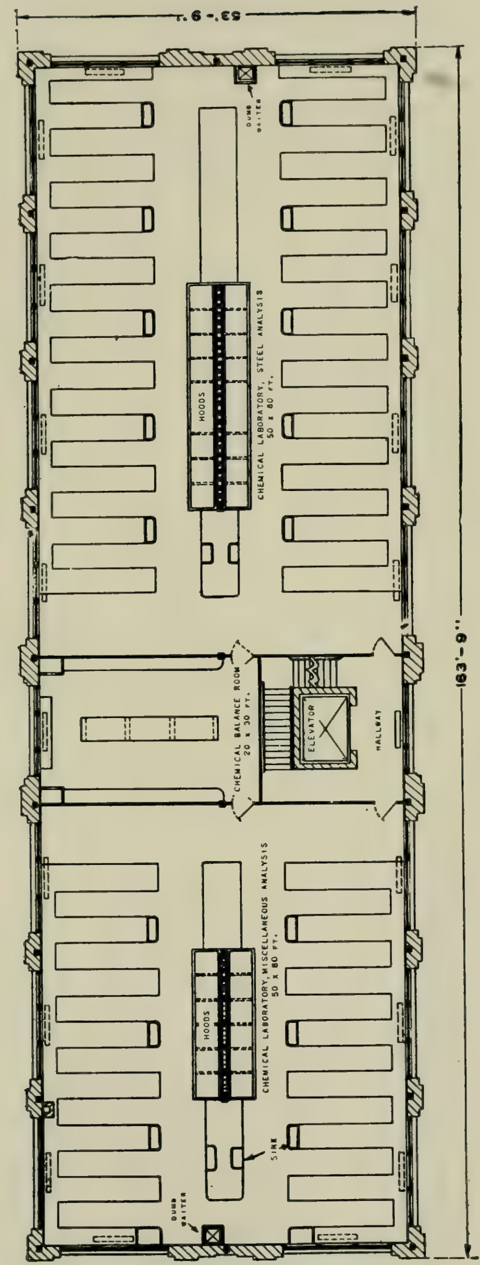
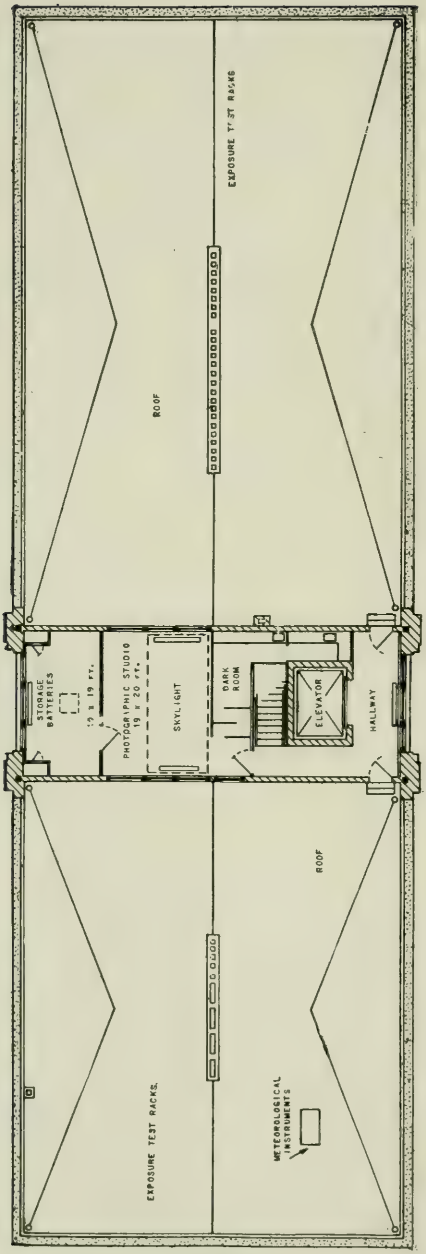


Fig. 9.—Fourth-Floor Plan.



Firg. 10.—Fifth-Floor Plan.

the past few months suitable instruments have been completed and installed for quick determination of the spherical candle power of incandescent lamps, under investigation.

A division of this laboratory is employed in investigations and development work along electrical lines and in the standardizing and maintenance of electrical instruments used by our electrical inspectors in the shops and at power plants. About two-thirds of the third floor is occupied by the electrical laboratories.

Chemical Laboratory.

By reference to the Diagrams, Figs. 5 to 10 inclusive, it will be observed that the space devoted to chemical investigations includes the entire fourth floor and about a third of the third floor, the larger part of the fourth floor being devoted to metallurgical work, such as steel for rails, boilers, forgings and car plate. A portion of the fourth floor is given up to chemical work upon non-ferrous metals, such as bearing metals, packing material and investigation of copper, tin, zinc and non-ferrous metals which are purchased under specifications for use at the foundries. The facilities are such that it has been possible to analyze 100,000 samples of steel in a year. Another portion of the fourth floor is devoted to work of a more general character, such as the examination of fuels, the development of specifications for paint products, lubricating and burning oils, boiler compounds, lacquers, plushes, car cleaners, cutting compounds, belt dressings, polishing compounds, hydraulic-jack liquids, fusees, track caps, fire extinguisher preparations, soaps and the devising of methods for the recovering of used or waste products.

The chemical properties of rubber compounds are investigated in a separate laboratory on the third floor, see Fig. 8, where research work is carried on for the simplication of rubber analysis, as well as to determine that the materials purchased for rubber insulation on wires have met the chemical requirements of this important specification.

Bacteriological Laboratory.

Since the year 1899,—long before the present regulations in regard to the disinfecting of cars, offices and waiting rooms, came into effect,—a laboratory for bacteriology was established and has become an important part of our facilities for safe guarding the patrons of the road from dangerous disease producing bacteria. This department regulates the standardization of disinfectants and issues instructions concerning their application for the protection of passengers and employes. In addition, this department is working in conjunction with the Medical Department, in order to prevent, as far as possible, a diseased employe coming in contact with the public. In 1914 bacteriological and chemical examinations were made of 609 samples of drinking water. There were 3112 bacteriological examinations of pathological specimens, submitted by the Relief Department physicians. The total number of bacteriological examinations was 3621, or an average of more than ten per day.

This department has under its care the examination of boiler feed waters and the formation of methods for their treatment, and the conditions are such that in 1914 there were approximately 300 examinations made of feed waters to be used for boilers at various points upon the road.

In order to facilitate the analysis of open hearth steel being rolled into rails, there is a laboratory car which can be moved from one mill to another, so that the steel as it is being fabricated can be surveyed for its chemical properties. This permits the obtaining of acceptance or rejection of material without delays to the mills.

Brake Shoe Laboratory.

We have just completed a laboratory for brake shoe tests. This consists of a separate building, containing a brake shoe testing machine, having two dynamometers, of a capacity of 4,000 pounds each. This machine is the first to be so constructed as to test two shoes per wheel and imitate the essential conditions met with in the "clasp brake."

The Extent and Variety of Materials Tested.

The year 1913 was perhaps a record one for the Test Department and Laboratory, and the extent and variety of the departments can be shown by a few examples for the year. There were 61,148 separate reports of material tests issued by the Test Department. In the Physical Laboratory, while no record was kept of the number of samples examined, 138,886 tests were made. These tests represented quantities such as the following:

Of bar iron 149,863,693 pounds were tested and 6,246,611 pounds rejected; of staybolt iron, 15,385 tests representing 8,301,960 pounds were made; of cement, 29,231 tests were made, representing 587,900 barrels, of which 13,600 barrels were rejected; of wheels 310,381 were inspected, and 1,213 were rejected; of axles, 164,810 were tested and 8,035 were rejected; 290 samples representing 56,322 yards of plush were tested; of air brake hose, samples representing 634,807 were tested and 84,826 rejected.

In the Chemical Laboratory, during 1913, a total of 57,309 samples were analyzed, involving about 286,545 determinations.

The leading materials which are now bought under specifications and which must be passed upon by the Test Department or the Chemical Laboratory or by both are as follows:

Asphaltum
Axles, 4 kinds
Barrels, metal
Bearings
Belting
Blue Vitriol
Bolsters, cast steel
Brake beams
Brake shoes
Brooms
Car roofing
Cars
Castings, steel
Caustic Soda
Chain
Conduit, steel
Copper, Ingot
Copper, Phosphor
Couplers
Crank Pins
Disinfectant
Electrolyte
Frames, Locomotive
Fusees, 2 kinds
Hose, air-brake
Hose, Misc.
Hose, signal
Hose, steam
Hose, tank
Hose gaskets
Iron, Merchant bar
Iron, Staybolt
Jack shafts
Knuckles
Lagging, Magnesia
Lamps, Incandescent
Lard Oil, 2 kinds
Lead, pig
Lubricator glasses
Lumber
Matting, rubber
Packing, journal box
Paint, cabin car
Paint, freight car
Paint, Indian Red
Paint, passenger car truck
Paint, refrigerator car
Paint, standard building
Paint, standard black
Paint, telegraph cross-arm
Paint, Tuscan Red
Paper, refrigerator car
Petroleum products, 5 kinds
Pipe, steel
Pipe, wrought iron
Pivot pins
Plush, 3 kinds
Sal Ammoniac
Soap, 3 kinds
Soda Ash
Sponges
Springs, elliptical
Springs, helical
Steam gages
Steam pipe covering
Steel, 21 kinds
Steel, plate coated 3 kinds
Sulfuric acid
Tallow
Thermometers
Tin
Tires, driving
Torpedoes

Truck sides
Tubes, boiler
Turpentine
Waste
Water gage glasses
Wheel, cast iron
Wheels, rolled steel
Wire and Cable
Wood creosote
Wood preserver
Wool, mineral
Zinc

During 1913 there were inspected, while building at manufacturers works, 24,966 freight cars, 343 steel passenger cars, and 190 locomotives.

The value of the material rejected through the Test Department in 1913 was as follows:

Physical Laboratory	$776,928
Chemical Laboratory	65,767

The cost of the material covered by the inspection and tests, and entering into the construction of the railroad rolling stock and track, in 1913 amounted to $82,119,480, while the cost of operating the Test Department and Chemical Laboratory for the same year was $534,060. For an approximation and using these figures, it is interesting to observe that the total cost of operating the departments, including all additional work and inspection, is about six tenths of one percent. of the cost of the material supervised.

The work of the department was about normal for the past year, 1915. We have about 160 specifications in force and the material tested in Altoona during the year 1915 is shown graphically on Fig. 1.

Specifications and Inspection.

Another equally important phase of our work is the inspection of material purchased and the formation of specifications.

The principal duties of a large testing laboratory, are not only those necessary to keep informed as to the developments in quality and as to changes made for commercial reasons, in the various materials purchased, by the railroad company, but also, to endeavor to cooperate with other laboratories, both of manufacturers and consumers, in unifying their views regarding the specifications which shall be selected for each of the purchased materials. A great deal of this work of harmonizing and unifying specifications has been accomplished during the past few years and has resulted in materially benefitting both the consumer and manufacturer, in that specifications agreed upon by a large number of people benefit all concerned in the following ways:

First. The manufacturer, without risk or loss on account of unsalable stock, can anticipate the needs of the large buyer and make material in accordance with what is accepted as good practice, so far as chemical and physical properties are concerned, and, therefore, when the consumer is in the market, he can readily obtain what he desires, as the manufacturers has some of the material of the grade in question either under way or completed, awaiting orders.

Second. This fact necessarily reduces the price at which the product can be sold because the manufacturer's production under uniform specifications may safely become large, and, instead of making a variety of products to meet a given demand, a single standard product is made for that particular demand or purpose. A lower price, however, does not necessarily mean that the manufacturer obtains a lesser profit on his material, it may be quite the contrary, as he may, even at a reduction in the price to the consumer under uniform specification purchases, be able to make even larger profits than before, because the same consumer and other consumers purchase a given grade of material more frequently and in larger quantities.

Third. If buyers are satisfied that, for their service, a material which meets a uniform specification will serve their requirements, they should adopt such specifications, as this will permit them to carry a smaller stock of material in order to protect their necessities for the reason that manufacturers will then be in a better position to furnish what the purchasers desire under short notice. A reduction in the total number and total amount of stocks held for emergency demands effects in turn a further money saving for the purchaser.

This work of harmonizing the various views of manufacturers and consumers and the framing of specifications in which they concur, has been an important part of the work of our Test Department, because, for the reasons as outlined, it is felt that a great benefit may be derived by such agreement. The larger number of our specifications are the result of this procedure, and it is suggested, as most desirable and logical, for the smaller purchasers,—who do not have laboratories providing for doing research work to establish the requirements of their specifications,—that they adopt such uniform specifications as have been created between those manufacturers and large consumers who do have the laboratories. Such specifications are to be found in the Proceedings of the Master Car Builders' Association, American Railway Master Mechanics' Association, American Railway Engineering Association and the American Society for Testing Materials.

A strong argument for uniform specifications is found in the interchange of cars, for, undoubtedly, it will be conceded that the material entering into their construction should satisfy all owners at once; obviously where cars are freely interchanged, much of the good effect of the use, by one owner, of material fulfilling a specification designed to insure safety of operation, is partially or wholly nullified if the cars of some other owners, built under an improper specification, and of material *not* of the desired quality and *not* insuring equal safety of operation come upon his line through the regular course of business interchange, and have to be operated by him.

The Interstate Commerce Commission inspection of locomotives tends to bring about like inspection and test conditions for all motive power and other important railway equipment as at present adopted or fast being adopted for cars for the reason that proper uniform specifications for locomotive parts will certainly tend to make such equipment more acceptable to the Government authorities.

It is the hope of the writer, therefore, with this phase of the matter in mind, that the discussion which will follow the presentation of this paper, will develop into a general discussion of this most important subject to the constructive benefit of all.

Publications.

That the information collected,—telling of the activities of the Chemical Laboratory and the Test Department of the Pennsylvania Railroad and of the developments which have taken place therein,—has been freely given to the public, is well exemplified by the papers and addresses which have been presented by the late Doctor Chas. B. Dudley.

In addition to the works of Doctor Dudley, there have been published by the Test Department some *29* printed bulletins, covering field tests and the work on the Locomotive Testing Plant. These bulletins contain pages of diagrams, tabulations and printed matter, and have been distributed to the public gratis. Among the noteworthy of the later bulletins may be mentioned the following:

Bulletin No. 5—Tests of a class E2a Locomotive.
"   " 10—Tests of a class H8sb Locomotive.
"   " 11—Tests of a class E3sd Locomotive.
"   " 13—The Smokebox Superheater.
"   " 16—Fuel Economy Tests.
"   " 18—Tests of a class K2sa Passenger Locomotive.
"   " 19—Tests of a class K-29s Passenger Locomotive.
"   " 21—Tests of a class E6s Passenger Locomotive.
"   " 22—Comparison of Passenger Locomotives.
"   " 23—Piston-Valve Diameter and Valve-Stem Stresses.
"   " 24—Superheater Tests.
"   " 25—Brake Tests.
"   " 26—Train Resistance and Tonnage Rating.
"   " 27—Tests of a class E6s Locomotive.
"   " 28—Tests of a class Lls Locomotive.
"   " 29—Tests of a class K4s Locomotive.

Other publications of the department are:
The Painting of Steel Passenger Cars. (1)
Locomotive Superheaters and their Performance. (2)
The Heat Treatment of Steel Castings. (3)
The New Physical and Chemical Laboratory of the Pennsylvania Railroad Company, Altoona. (4)

With the facilities described and the excellent organization built upon the experience of over forty years, it is apparent that the Pennsylvania Railroad Company is in a position to exercise the closest supervision over its purchase of supplies, and that it is contributing to the development of the art in the construction of locomotives and cars and in the improvement of the quality of the materials entering into their construction, as well as of those entering into the construction of the right of way. It is endeavoring to keep abreast not only with the development of the materials of construction, methods of health preservation, and safety of railway operation, but also to be in the fore as it should be, and as it has always attempted to be, in dealing with the many and diversified technical problems continually arising.

1. The Author, Journal American Society Mechanical Engineers, April, 1913.
2. The Author, Journal Franklin Institute, July and August, 1914.
3. The Author, O. D. A. Pease and C. H. Strand, Proceedings, American Institute Mining Engineers, February, 1914.
4. The Author, Proceedings, American Society for Testing Materials, June, 1915.

DISCUSSION

PRESIDENT: This has been a very interesting paper, and it is now open for general discussion. Mr. Young wants to make a train so I will ask you to enter into the discussion promptly.

SECRETARY: We are honored tonight by the presence of a former Vice-President of this Club, a past President of the Central Railway Club of Buffalo, N. Y., and Superintendent of Motive Power of the Northern Division, Pennsylvania R. R., Mr. William Elmer. I suggest the privilege of the floor be extended to Mr. Elmer as the first speaker.

PRESIDENT: We shall be very glad to extend the privilege of the floor to Mr. Elmer.

MR. WILLIAM ELMER: Gentlemen, it is a very pleasant sensation to be back again and see so many faces that I knew a few years ago. It is about five years since I left Pittsburgh and I can agree with Mr. Young that I do not think we ever had such a turnout even when I read a celebrated paper.

I might say that I was all over the laboratory at Altoona today with Mr. Wallis and if any of you gentlemen have the opportunity to go to Altoona it will be well worth your while to go and ask Mr. Young to assign some one to show you over it, just to get an idea of what that wonderful plant is doing.

While the figures Mr. Young gave are astonishing they can not convey a clear or adequate impression on what is going on. And when he speaks of the thousands and hundreds of thousands of tests, you have got to see that definite plant and note the number of men and the facilities before you can get a clear idea of what is going on. That last picture, the locomotive testing plant, is one of the most inspiring things I ever saw. Standing on the floor I saw a great locomotive doing its heaviest work, burning 10,000 or 11,000 pounds of coal an hour, stationary except for the rolling and vibration of that big mass of machinery. You have no idea how it impresses you. The fireboxes are sometimes provided with inspection openings so you can stand on a small step ladder and look into the fire box and see the coal dancing on the grate and up against the arch and the tremendous rate of combustion going on in there, you have some idea of how a locomotive must be designed and the materials in it carefully inspected to be sure that when completed the machine will be capable of doing the work it is called upon to do and stand up in service year after year. I do not want to take up any more time because I know there are a number here who want to take part in the discussion, and I can only say that I thank you very much.

PRESIDENT: May we hear from Mr. Walter V. Turner, of the Westinghouse Air Brake Company?

MR. WALTER V. TURNER: I did not expect to take part in the discussion. I hardly think I am qualified. It is a good many years since I was in railroad work and in the west there are no such laboratories and testing apparatus as we have seen here.

If in so doing I can add any emphasis to what Mr. Young said with regard to other railroads and manufacturing concerns following the Pennsylvania specifications, I will say that I know of nothing that would be of greater service, not only to the manufacturing concerns and to the other railroads but to the public as well. There isn't anything anywhere which equals the wonderful work of the Pennsylvania in this respect, I believe. And I have traveled quite a little. It has been one of the greatest pleasures of my life to appeal to Mr. Young and his assistants in developing any apparatus and finding out whether it is worth anything or not. When a man tries to do the development work which my assistants and I have done in this part of the country, he finds how difficult it is to get men who are not directly interested to help, and then finds that he can go to the Pennsylvania Railroad and have placed at his disposal any amount of money and all the cars, tracks and men that he wants, and in fact every assistance possible to work the thing out. You can appreciate from experiences of this sort that I have had, how thankful I feel to the Pennsylvania Railroad for the help they have been to me and to those with whom I am concerned.

Some time ago we built a new passenger brake. The thing looked formidable enough to frighten anybody. I think Mr. Young will agree that there was no more complicated mechanism in the world than the universal valve for passenger service. When Mr. Wallis, Mr. Young and other railroad officials came to the works to look at that valve I expected nothing but a flat refusal to entertain such a proposition. Some years ago I was talking with Mr. Elmer about handling passenger cars and trains, and he said at that time the only way to successfully handle (such) long trains and heavy vehicles was to do it electrically. And he concluded by saying that he did not expect to see it done. It was too complicated; it had such a hard road to travel; there were too many men opposed to it and too few who realized its value. I want to say that there is an electro-pneumatic train running on the Pennsylvania Railroad and it has been running for two years. And I presume the entire Pennsylvania Railroad will be equipped with electro-pneumatic service inside of two or three years.

How did that come about? By nothing else than the policy of the mechanical men at the head of the Company. There was not a man in ten thousand, one in a hundred thousand, who ever dreamed that an electro-pneumatic brake had a possible chance on steam railroads, but Mr. Wallis and his assistants gave us a twelve car train, the best engine and track on the road, all the men and instruments we wanted, and we demonstrated to their satisfaction that the electro-pneumatic brake is the only thing by which you can safely, comfortably and economically handle passenger equipment on the main lines of American railroads.

I might go on and mention many other things such as the freight brakes which the Pennsylvania are installing and making the standard brake in this country. What a wonderful thing it is to see a laboratory like this on a railroad. In general there isn't a thing that a man can try to sell to the Pennsylvania Railroad about which they can not tell him more about than he knows himself. And they will tell him that if he will build his goods according to these specifications he will make some money because they will buy from him. They are actually serving as a chemical and a physical laboratory for any manufacturing concern in this country that cares to manufacture goods, and when the goods are made that way they have a good market because the Pennsylvania Railroad is not partial to any manufacturer in this country. The man that can make the goods is always sure of a customer.

I think a laboratory like that would be of about as much use as the fifth wheel to a wagon if they did not have the right kind of man at the head of it. Mr. Young gives the young men who are working for him, and the old ones, too, every kind of encouragement. I know for I have tried to steal some of them away from him. When they get through his hands they are fit for almost anything in the way of engineering. So he is not only working out a laboratory for the use of all the people of this country but also training young men who will work for other people in similar branches of industry. For that reason I think the work the Pennsylvania is doing deserves to be warmly encouraged.

Now we have at the Westinghouse plant a testing plant and I know of no industrial concern in the world that has one like it. We have almost as large a testing plant as the Pennsylvania Railroad, taking into consideration all the space upon which our testing and developing apparatus is placed, and it probably cost just as much. We have also a dynamometer car which has paid the Westinghouse Air Brake Company. There isn't any company that can surpass the Westinghouse Air Brake Company in the way of brakes manufacture. And so I am probably as well qualified to speak of the value of laboratories as is Mr. Young himself. Some of the most wonderful things ever produced have passed through the Westinghouse Air Brake Company plant. I mention this merely to impress you with my conviction that there is nothing in the world that will pay a concern equal to knowing what it is doing. If you do not know what you are doing how are you going to combat the other fellow's statement? I do not want anything more than to take some "Doubting Thomas" and put him up against it and say "Now prove your case." "Here is any apparatus you want."

To that end I want to say that all of us should encourage in every way possible the adoption of uniform specications. It will do what Mr. Young says, it will increase the profits to the concern and reduce the cost to the consumer. And when you have done that you have done some good in the world. I want to thank Mr. Young personally for the exhibition he has given us tonight.

PRESIDENT: Professor Endsley, of the University of Pittsburgh, is present and we would like to hear from him.

PROFESSOR L. E. ENDSLEY: I am very glad to hear Mr. Young's paper. I have known Mr. Young for a good many years and have had the pleasure several times of going all through his testing plant as well as the other parts of the shop at Altoona, and I have just returned from a three days trip with my senior students of the Railway Department of the University of Pittsburgh, and we spent a whole day in the locomotive testing plant and other parts of the test laboratory. It is wonderful the things they are doing, and all the things they do are going to help not only themselves, but to help others. There is no doubt about what Mr. Young said that every dollar spent there is coming back with another dollar and interest. There is no doubt in my mind that the railroads of the United States could have spent ten millions on test plants ten years ago that would have been worth a hundred millions to them today. Very few roads have done anywhere near what the Pennsylvania did say twenty years ago.

I had the pleasure many years in my life of having charge of the Master Builders Laboratory at Purdue University, and it is a very pleasant line of work and you need not be sorry for Mr. Young for if he likes the work as much as I do, he is happy every day of the week even if he works on Sundays.

PRESIDENT: May we hear from Mr. S. W. Dudley, of the Westinghouse Air Brake Company?

MR. S. W. DUDLEY: It may be of interest to mention one experience which proves that much has already been accomplished in the direction of one of the ideals which Mr. Young has mentioned. A few months ago, in conversation with representatives of a foreign government, (not, by the way, interested in munitions manufacture) they said that among the specifications for railroad materials which they had brought with them, there were, in many cases clauses appended to their own specifications permitting the builders in this country to manufacture according to P. R. R. specifications, if the foreign specifications could not be met in all particulars. That seems to me a sign that foreign countries are observing and profiting by what is being done at Altoona. If we in this country, both railroads and manufacturers are not at least as wide awake as they are on the other side, (and we think we are a good deal more so) we can profit greatly by the opportunity we have had this evening of realizing the comprehensiveness of the work of the Pennsylvania Railroad's Test Department and the generosity which freely places this information within the reach of all interested. Any one who takes the trouble to observe what is being done at Altoona and become acquainted with the personel of their organization will unhesitatingly acknowledge the great obligation of our railroads and the public to the broad policies and high ideals which have made such a paper as that we have listened to this evening possible.

PRESIDENT: Mr. Leech, of the Carnegie Steel Co.?

MR. J. O. LEECH: I do not believe that I can add anything to what Mr. Turner has said. I think Mr. Young's excellent paper has covered the ground thoroughly. I would simply confirm all that Mr. Turner has said with reference to it.

PRESIDENT: Mr. A. Stucki?

MR. A. STUCKI: The paper which Mr. Young has presented to us is so clear and so complete that I wouldn't know how to add anything to it, but since I am up I may emphasize two thoughts which struck me very forcibly.

Some years ago, I talked with a railroad official of a smaller western road about the good work that was done at Altoona in connection with the thermal test on wheels, but did not get the hearty acknowledgement I expected. None the less, I found that the latest wheel specifications of that road had the thermal test incorporated, and this is going to show again that work carried on as just explained by Mr. Young is often doing good to all of us and to all the railroads without we appreciating the original painstaking, unselfish research work preceding the adoption of the improvement.

The other thought relates more to a comparison of such work as done by the government on the one side as against that done by private roads. We nowadays hear so much about government ownership of railroads and we have also a very good example of what it has led up to in Europe in this respect. It is true, the rules and regulations are carried out to extreme precision, but this does not mean progress and does not mean comfort and safety to passengers or economy and dispatch in handling freight.

Even our own government so far is only adopting regulations and restrictions. Should we therefore not doubly appreciate the great efforts of our private roads in their endeavor to make progress in all the various branches of railroading, in the rolling stock and in the tracks, so as to operate economically, safely and to the best advantage of the public. Should we not doubly appreciate their research and their testing work, without which we could not have attained the highest standard amongst all railroads on the globe?

PRESIDENT: Mr. Crittenden, Electrical Engineer of the Westinghouse Air Brake Company?

MR. P. L. CRITTENDEN: I do not believe I have anything to add to the discussion. It is quite evident however that that plant is a marvelous thing and it is very interesting to me to realize that there is so much attention given to the electrical side of testing materials on a steam road. The point Mr. Turner brought up shows what is going on and that is that the electrical end of railroading is coming to the front more and more and that the electrification of the brake is a very important step.

PRESIDENT: Mr. Frank J. Lanahan, President, Fort Pitt Malleable Iron Company?

MR. FRANK J. LANAHAN: "Actions speak louder than words." Sufficiently interested was I in the paper that Mr.

Young was reading, that I left a sick room to be here tonight, and have enjoyed so much what I have heard and seen, that I can go back home almost well. Being engaged in the foundry business, there were many things that Mr. Young said and showed which were interesting to me. Of course I feel rather unsophisticated as to the various technical apparatus Mr. Young exhibited. I confess some of them were beyond my understanding, in fact, I feel somewhat like the Irishman when he first saw a trolley car, and asked his fellow-countryman what made it go, this hibernian replied, "Sure its that bamboo rod fastened up there on that wire." "Bedad," said the one seeking the information, "Sure and I knew it had to be something devilish strong." As I looked tonight at the various appliances Mr. Young has installed, and listened to his description of that complete laboratory at Altoona, I realized that it must be a man of large caliber to work out these complex problems. Particularly pleased was I to hear Mr. Young's words relative to cooperation with manufacturers, and the testing of their product in the constant effort to raise the standard of their respective merchandise. Taking the clue from Mr. Turner's remarks as to his company's working in conjunction with the Pennsylvania Railroad, I will state that we in a small way, are endeavoring to follow the same line. We have established our own laboratory, installed testing machines, so as to meet intelligently the demands that are made for malleable iron of a superior quality. From what I learn, I believe that a great many other manufacturers are doing the same thing. This certainly is a step in the right direction, for in the absence of proper appliances for determining the raw material, and the testing of the finished product, material that does not measure up to what it should is shipped out not purposely defective, but simply through ignorance. A laboratory under competent management would be a safeguard. The work Mr. Young has done at Altoona speaks much for the advancement of the industrial practice of the country. For one, I am deeply grateful for the opportunity of listening to this evening's paper, and I am sure that all present will derive no little benefit from its valuable contents.

PRESIDENT: Mr. D. J. Redding, Assistant Superintendent Motive Power, P. & L. E. R. R.

MR. D. J. REDDING: The remarkable feature in this paper, to me, is the fact that the Pennsylvania Railroad have gone to such great expense in the erection of this magnificent laboratory, its maintenance, and the employment of the necessarily large number of experts to carry on the work. Undoubtedly, however, this is a paying investment, as shown by the figures submitted by Mr. Young as to the vast quantities of material rejected, most of which would very likely have been purchased and put into service had it not been subjected to the rigid tests referred to in this paper.

Those who do not maintain testing laboratories and inspection bureaus may well question whether or not they receive any portion of these thousands of tons of material that the Pennsylvania rejects each year. I trust that very little of it comes to the New York Central Lines, as our Company also maintains quite an extensive testing bureau and inspection department, but quite a number of smaller roads and private concerns are not in a position to protect themselves in this manner.

It is a fact, as Mr. Lanahan has said, that most manufacturers want to furnish the best material that they can. There are exceptions to all rules, however, and I have known of cases where very inferior material has been shipped to consumers, usually located in the near vicinity of the manufacturer, possibly with the thought in mind that if this material is rejected, the freight rate would not be excessive on its return shipment.

I had no idea that the Pennsylvania testing laboratory was organized on so elaborate a scale, and hope sometime to have the privilege of visiting it. I take this opportunity to move a vote of thanks to Mr. Young in appreciation of his very excellent paper, and would suggest a rising vote.

PRESIDENT: Before putting that motion we will give Mr. Young an opportunity to close the discussion.

MR. YOUNG: There is very little that I can say in closing. Instead of getting bricks I have gotten boquets and it is not very hard to defend oneself against boquets. I certainly appreciate very much the cordial way in which you have received the paper. Mr. Turner has brought out my real purpose, which is to harmonize the views of the consumers and manufacturers toward a more general use of one set of specifications for a given grade of material. I have not been in the testing business very long, having came up in the operating end of the motive power department, but when I went into the special department of testing I was impressed with the wide variation in specifications used by consumers in this country. The manufacturers criticized pretty generally every specification and thought we should abandon them entirely and buy on proprietary trade names. It has been the endeavor of our department to get the manufacturers to see that it is for their own good to have one specification and a large volume of business on that one. Results have certainly been accomplished along this line by the American Society for Testing Materials, a society composed of manufacturers and consumers. Mr. Turner suggested the use of the P. R. R. specifications. I suggest the specifications of the Society for Testing Materials and the M. C. B. Association because you will find these practically identical and much broader in some terms than ours and probably would fit your conditions. Ours are constructed along a certain line of policy and they might not so nearly meet your views as the more general specifications of the Societies mentioned.

The manufacturers have gotten to a point where they will accept these specifications without question. Pittsburgh manufacturers I think are pretty much of a unit in agreeing that it is desirable to have specifications, and it means that you are now buying a superior article for less money and the manufacturer is making perhaps a larger margin of profit than he formerly did. So if I have made that point clear to the consumers particularly, that it is desirable to have uniform specifications, such as the Lloyds, or the British and the German specifications, all of which are not equal to the American specifications of today, I will have accomplished my aim, and I think you will be pretty well pleased with the materials you purchase under these specifications.

The rising vote of thanks was carried unanimously.

PRESIDENT: This is the last meeting until September. We hope you will enjoy your vacation and all meet here at the opening meeting in the fall. The meeting is now adjourned.

J. B. Anderson
Secretary.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Official Proceedings—The Railway Club of Pittsburgh published monthly, except June, July and August at Pittsburgh, Pennsylvania, April 1st, 1916.

State of Pennsylvania }
County of Allegheny } *ss.*

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. B. Anderson, Secretary, who, having been duly sworn according to law, deposes and says that he is the Editor and Publisher of the Official Proceedings—The Railway Club of Pittsburgh, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, J. B. Anderson, Secretary, 207 Pennsylvania Station, Pittsburgh, Pa.

Editor, J. B. Anderson, Secretary, 207 Pennsylvania Station, Pittsburgh, Pa.

Mangaing Editor, (None).

Business Managers, (None).

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

The Railway Club of Pittsburgh, 207 Pennsylvania Station, Pittsburgh, Pa.; President, F. M. McNulty, Superintendent Motive Power, Monongahela Conn. R. R., Pittsburgh, Pa.; Secretary, J. B. Anderson, Chief Clerk to Superintendent Motive Power, Pennsylvania Railroad, Pittsburgh, Pa.; Treasurer, F. H. Stark, General Superintendent, Montour R. R., Coraopolis, Pa.

3. That the known bondholders, mortgagees, and other security-holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

(None)

J. B. ANDERSON,
Signature of editor, publisher.

Sworn to and subscribed before me this 1st day of April, 1916.

F. D. ECKER,
[SEAL] *Notary Public.*

My commission expires January 15, 1917.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of May, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—"Litherage," by H. L. Joyce.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—(Unknown).

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.

SUBJECT—Annual Meeting.

Richmond Railway Club, F. O. Robinson. Sec'y, Richmond, Va.

SUBJECT—"Automatic Stop and Train Control," by Stephen Smith.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—"Tests of Bridge Timbers and Ties," by H. F. Weiss.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.

SUBJECT—"The Advancement of Postal Car Construction and Lighting," by Chas. H. Otis.

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.

SUBJECT—"Modern Superheaters," by S. S. Reigel.

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

SUBJECT—"The Activities of a Railroad Test Department," by C. D. Young.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

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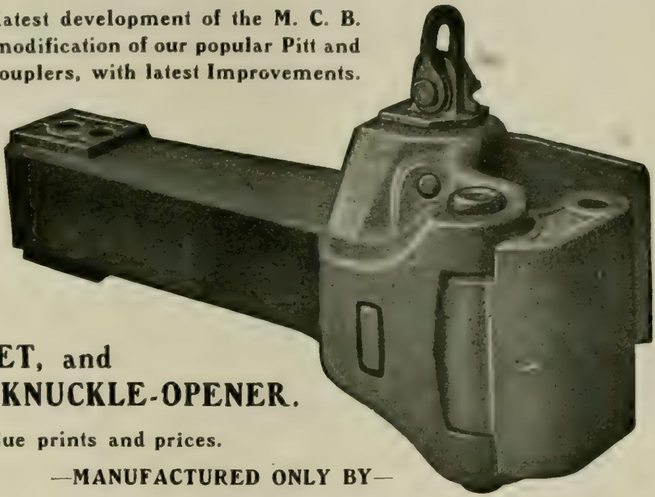

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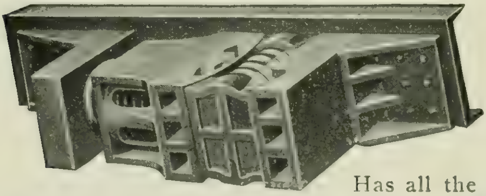

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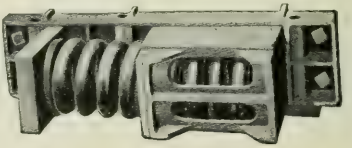

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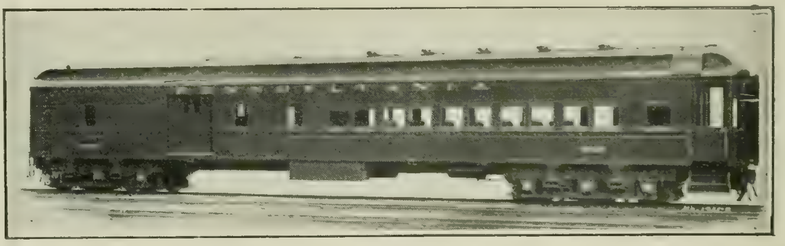

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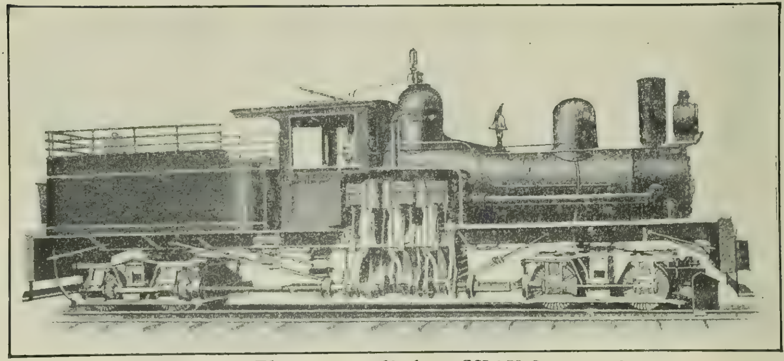

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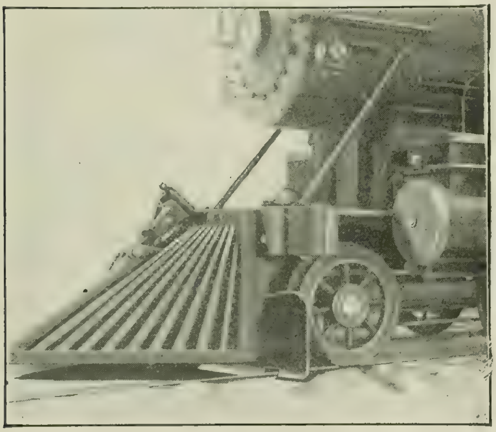

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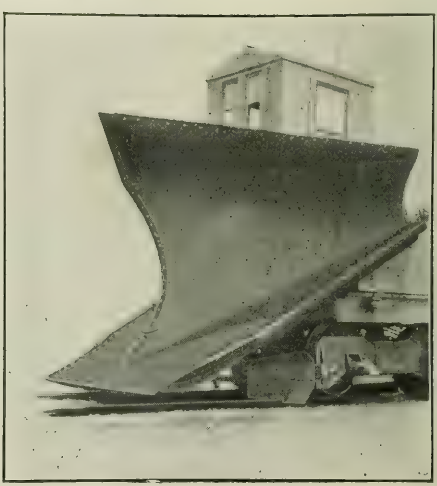

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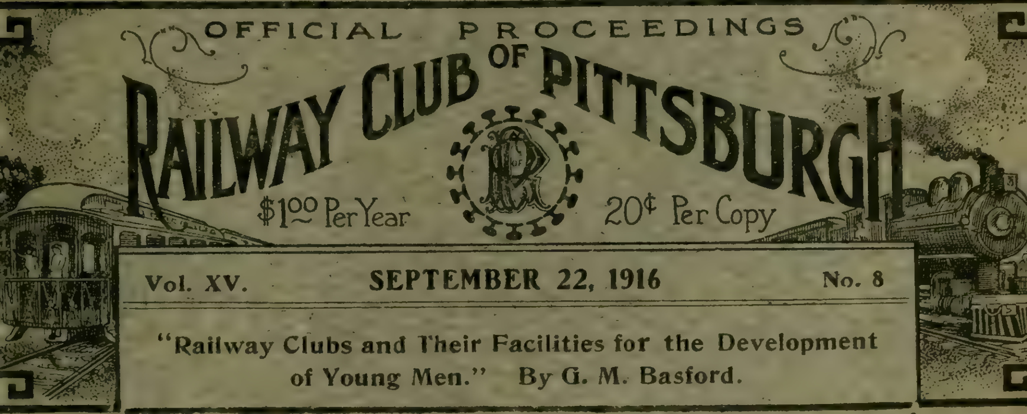

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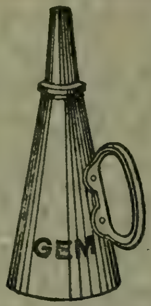

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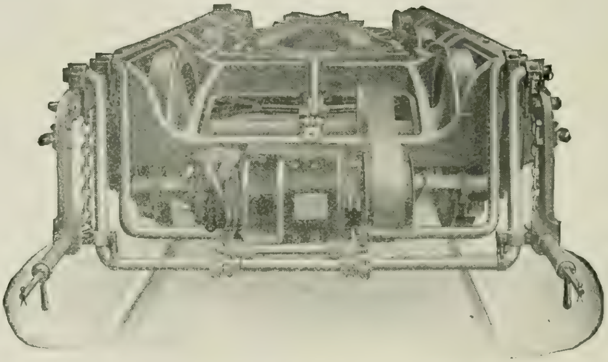

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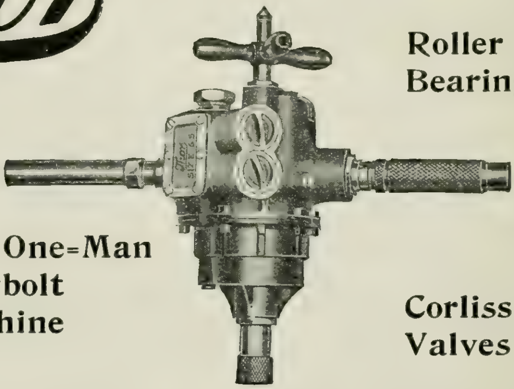

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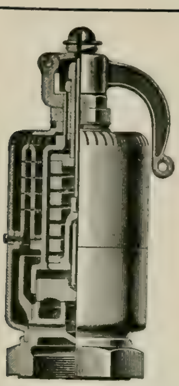

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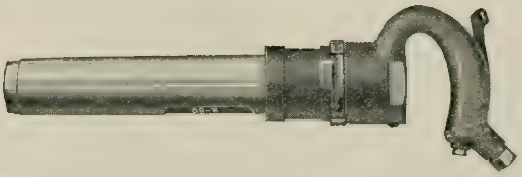

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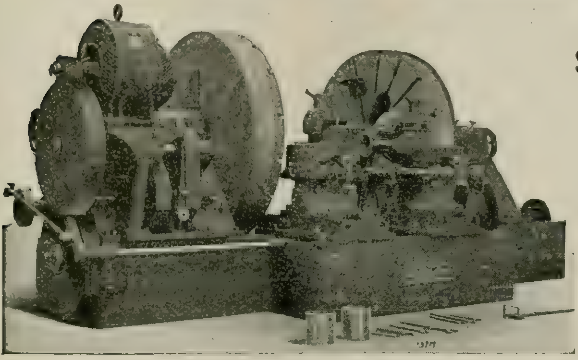

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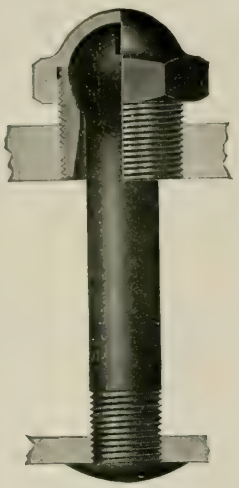

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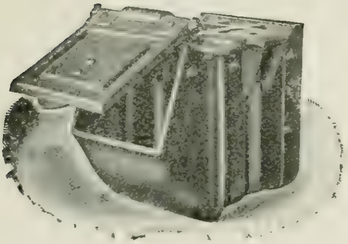

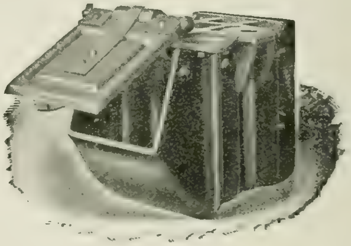

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D. H. AMSBARY,
Dist. Manager, Dearborn Chemical Co.,
Pittsburgh, Pa.

Past President

J. H. McCONNELL	October, 1901, to October, 1903.
L. H. TURNER	November, 1903, to October, 1905.
F. H. STARK	November, 1905, to October, 1907.
* H. W. WATTS	November, 1907, to April, 1908.
D. J. REDDING	November, 1908, to October, 1910.
F. R. McFEATTERS	November, 1910, to October, 1912.
A. G. MITCHELL	November, 1912, to October, 1914.

* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING, SEPTEMBER 22, 1916.

The regular monthly meeting was called to order in the rooms of the Pittsburgh Commercial Club, Colonial Annex Hotel, Pittsburgh, Pa., at 8 o'clock, P. M., with President McNulty in the chair.

The following gentlemen registered:

MEMBERS.

Amsbary, D. H.
Anderson, J. B.
Barth, J. W.
Batty, John
Basford, G. M.
Bean, W. H.
Blakely, T. M.
Bosley, N. D.
Botsford, C. F.
Boyer, J. B.
Brown, A. D.
Calvin, A. W.
Clark, C. C.
Cline, W. A.
Code, J. G.
Copeland, T. T.
Cooper, W. M.
Cunningham, R. I.
Dambach, C. O.
Donovan, P. H.
Dudley, S. W.
England, A.
Farquhar, L. C.
Francis, W. T.
Forcier, C. W.
Gale, C. H.
Geddes, Jas. R.
Gies, George E.
Guay, J. W.
Haynes, J. E.
Hicks, George H.
Hoffman, C. T.
Howe, D. M.
Hudson, W. L.
Huston, F. T.
Huchel, E. W.
Huchel, H. G.
Huchel, Wm. J.
Knox, Wm. J.
Knickerbocker, A. C.
Lanning, C. S.
Lansberry, W. B.
Lawley, R. N.
Laylin, M. H.
Lidstone, F. J.
Lobez, P. L.
Loughridge, H. W.
Low, J. R.
Lynn, Saml.
Maylock, E. A.
Millar, C. W.
Miller, F. L.
Mitchell, John
McCollum, G. C.
McDonnell, F. V.
McFarland, H. L.
McNulty, F. M.
Neff, John P.
Nell, T. M.
Newburn, T. W.
Orbin, G. N.
O'Conner, M.
Parke, F. H.
Pennington, F. W.
Phillips, Lee
Lindner, W. C.
Richardson, C. A.
Redding, D. J.
Robbins, F. S.
Rooney, E. S.
Schultz, George H.
Sleeman, Wm. C.
Smith, Williard A.
Smith, W. R.
Snyder, J. W.
Stamets, W. K.

Stucki, A.
Taylor, H. G.
Thomas, J. H.
Turner, L. H.
Turner, Walter V.
Vowinkle, F. F.
Warne, J. C.
Weiss, Chas.
Wilder, H. W.
Williamson, J. A.
Wright, Roy V.
Wyke, J. W.
Yungbluth, B. J.
Zortman, C. E.

VISITORS.

Anderson, P.
Breit, C. A.
Burgess, T. S.
Cunningham, W. P.
Code, Chas. J.
Davis, F. L.
Davis, W. R.
Dean, W. E.
Klemfelder, R.
Kiehm, G. W.
Leech, E. A.
Long, R. M.
McIntosh, R. S.
Osborne, L. E.
Pease, R. F.
Stablman, M. C.
Gilg, H. F.
Frazier, R. S.
Hamilton, W. A.
Thompson, D. D.
Haskin, E. G.
Hilins, S. M.
Holdsworth, Dr. J. T.
Hykes, W. H.
Jackson, W. E.
Stenson, G. A.
Thorne, H. A.
Turner, A. L.
Turner, J. A.
Townsend, T. T.
Wibner, A. J.
Wright, J. B.
Yeager, W. H.
Zacharias, J. W.

Roll call was dispensed with, the record of attendance being had from the registry cards.

The reading of the minutes of the May meeting was dispensed with, the Proceedings having been already printed and distributed.

The Secretary announced the following applications for membership:

Anderson, G. S., Electrician, Pennsylvania R. R., Box 22, Pennsylvania Station, Pittsburgh, Pa. Recommended by C. D. Caine.

Barry, Jas. F., Electric Foreman, Carnegie Steel Co., Isabella Furnaces, Sharpsburg, Pa. Recommended by Chas. Orchard.

Cunningham, W. P., Master Mechanic, Winfield R. R., West Winfield, Pa. Recommended by D. J. Redding.

Curran, John, Machinist, Carnegie Steel Co., Lucy Furnaces, 51st Street, Pittsburgh, Pa. Recommended by Chas. Orchard.

Gilg, Henry F., Salesman, Penn Iron & Steel Co., Box 190, N. S., Pittsburgh, Pa. Recommended by J. B. Anderson.

Goff, Frank, Representative Goff Electric Pneumatic Brake Co., Camden, N. J. Recommended by John W. Barth.

Graham, Edwin A., Steam Engineer, Carnegie Steel Co., City Furnaces, Sharpsburg, Pa. Recommended by Chas. Orchard.

Haskin, E. G., Shop Draftsman, Locomotive Stoker Co., 806 Frank Street, McKees Rocks, Pa. Recommended by J. B. Anderson.

Heald, Edward, Locomotive Repairman, Carnegie Steel Co., Isabella Furnaces, Sharpsburg, Pa. Recommended by Chas. Orchard.

Huston, F. T., General Car Inspector, Pennsylvania Lines West, Fort Wayne, Ind. Recommended by D. F. Crawford.

Jester, Walter, Locomotive Repairman, Carnegie Steel Company, Lucy Furnaces, 51st Street, Pittsburgh, Pa. Recommended by Chas. Orchard.

Mast, Harry, Master Mechanic, Carnegie Steel Co., Lucy Furnaces, 51st Street, Pittsburgh, Pa. Recommended by Chas. Orchard.

Morris, H. W., Purchasing Agent, Wabash-Pittsburgh Terminal Railway, 125 Noblestown Avenue, Carnegie, Pa. Recommended by J. G. Code.

Murphy, Michael, Locomotive Crane Operator, Carnegie Steel Co., Lucy Furnaces, 51st Street, Pittsburgh, Pa. Recommended by Chas. Orchard.

Osborne, L. E., Chief Draftsman, Locomotive Stoker Co., Robinson and Darrah Streets, N. S., Pittsburgh, Pa. Recommended by J. B. Anderson.

Reese, O. P., Assistant Engineer Motive Power, Pennsylvania Lines, 1002 Pennsylvania Station, Pittsburgh, Pa. Recommended by D. H. Amsbary.

Rihn, George, Locomotive Repairman, Carnegie Steel Company, Isabella Furnaces, Sharpsburg, Pa. Recommended by Chas. Orchard.

Sampson, W. F., Assistant Master Mechanic, Pennsylvania R. R., 28th Street and Liberty Avenue, Pittsburgh, Pa. Recommended by F. S. Robbins.

Silicox, Lewis K., Mechanical Engineer, Illinois Central R. R., 5338 Dorchester Avenue, Chicago, Ill. Recommended by J. B. Anderson.

Smith, C. P., General Manager, P. L. & W. R. R., Lisbon, Ohio. Recommended by D. M. Howe.

Wright, John B., Secretary Engineering Department, W. A. B. Company, Wilmerding, Pa. Recommended by Walter V. Turner.

PRESIDENT McNULTY: As soon as these names have been favorably passed upon by the Executive Committee the gentlemen will, upon payment of one year's dues, become members of the Club.

The Secretary read the report of the Nominating Committee as follows:

Pittsburgh, Pa., September 22, 1916.

To the Officers and Members
The Railway Club of Pittsburgh

Gentlemen:

Your Nominating Committee appointed by the President at the regular meeting of the Club in May begs leave to submit the following nominations as Officers of the Club for the fiscal year, beginning November 1st, 1916:

President—J. G. Code, General Manager, Wabash-Pittsburgh Terminal R. R.

First Vice-President—H. H. Maxfield, Superintendent Motive Power, Pennsylvania R. R.

Second Vice-President—D. M. Howe, Paint Expert.

Secretary—J. B. Anderson, Chief Clerk to Superintendent Motive Power, Pennsylvania R. R.

Treasurer—F. H. Stark, General Superintendent, Montour R. R.

Executive Committee:

L. H. Turner, Supt. Motive Power, P. & L. E. R. R.
D. J. Redding, Asst. Supt. Motive Power, P. & L. E. R. R.
F. R. McFeatters, Superintendent Union R. R.
A. G. Mitchell, Superintendent, Pennsylvania R. R.
F. M. McNulty, Supt. Motive Power, Monon. Conn. R. R.

Finance Committee:

Stephen C. Mason, Secretary, The McConway & Torley Co.
E. K. Conneely, Asst. to Vice-President, P. & L. E. R. R.
C. A. Lindstrom, Asst. to President, Pressed Steel Car Co.
L. C. Bihler, Traffic Manager, Carnegie Steel Co.
Walter V. Turner, Asst. Mgr., Westinghouse Air Brake Co.

Membership Committee:

Frank J. Lanahan, President, Fort Pitt Malleable Iron Co.
A. Stucki, Engineer.
C. O. Dambach, Supt., Wabash-Pittsburgh Terminal R. R.
Harry Howe, Inspector, Pressed Steel Car Co.
R. L. Kleine, Chief Car Inspector, Pennsylvania R. R.
B. E. D. Stafford, General Manager, Flannery Bolt Co.
Samuel Lynn, Master Car Builder, P. & L. E. R. R.

Entertainment Committee:

D. H. Amsbary, District Manager, Dearborn Chemical Co.
Harry Murdoch, President, H. Murdoch & Co.
E. C. Sattley, General Mgr., Page Woven Wire Fence Co.

WALTER V. TURNER,
D. J. REDDING,
F. H. STARK,
Committee.

PRESIDENT McNULTY: Under the constitution the vote will be by ballot. If for any reason you wish to vote for others than those nominated by the Committee, you are at liberty to insert the name of any member of the Club for any office.

The Secretary announced the result of the benefit performance at the Alvin Theatre on April 7, 1916, as follows:

Alvin Theater Party—The Only Girl—April 7, 1916.

RECEIPTS

Sale of tickets through members	$ 983 50		
Sale of tickets at Theater	749 50		
Total		$1733 00	
From advertisements in Souvenir Program		2161 00	
Grand total			$3894 00

EXPENSES

The Only Girl Company and Alvin Theater	1200 00	
Printing circulars, tickets, etc.	72 90	
Printing Program	375 00	
Other incidental expenses	88 07	
		$1735 97
Total net receipts		$2158 03

On motion a rising vote of thanks was extended to Mr. D. H. Amsbary, the Chairman of the Entertainment Committee, to whose efforts the success of the undertaking was largely due.

Upon motion of Mr. Walter V. Turner a vote of thanks was extended to the Committee for arranging the meeting place of the Club in new quarters.

Mr. J. G. Code suggested the desirability of a special committee to arrange for one or more meetings this winter at which transportation topics might be discussed, and upon his motion the Nominating Committee was directed to appoint a Committee of five members to assist the Executive Committee in the choice of subject by arranging for one or more papers on a strictly transportation subject.

The Secretary announced with regret the death of the following members: H. J. Shook, November, 1915; S. R. Wilson, June 9, 1916 and J. M. James, September 17, 1916.

PRESIDENT McNULTY: An appropriate memorial minute will appear in the next issue of the Proceedings.

If there is no further business, we have with us this evening Mr. G. M. Basford, President, Locomotive Feed Water Heater Company of New York City, who will read a paper on "Railway Clubs and Their Facilities for the Development of Young Men." I take great pleasure in introducing Mr. Basford.

INTRODUCTION

Mr. Roy V. Wright—the friend of everybody—has called my attention to the curious coincidence of the subject of this evening and of that of the very first paper presented to this club at its earliest meeting. On that occasion Mr. J. E. Simons addressed you on the subject:—"Relation of the Young Men to Our Club." Among other good things, he said:

> "If the young man's energy is properly applied we find him rapidly forging to the front, but on the other hand, if he is not diligent, he will drop by the wayside and find that he is not without competitors."

Think of the young men trained by the railroad clubs, who have come to the front since that evening. The club trained men are the best in railroad service today. If those of earlier generation had enjoyed the training in their younger days some of them would not make the bad breaks they make today and they would not have been passed by younger men.

You—young men—have a better opportunity before you. This club now has 1014 members. What can this club do? Wonders! But it is necessary to wake up and look around.

When this club began, the biggest locomotive in the world was, I believe, a Consolidation, running here in Pittsburgh. For a long time after that locomotives ran to size and weight. It was easy to make them bigger and heavier and the young men Mr. Simons addressed did it very well.

But a far greater and more difficult as well as more important problem faces us young men today. It is the problem of forcing every pound of weight to justify itself in terms of power to serve mankind. Who has a bigger, nobler opportunity and duty than this?

When our club began, officials wouldn't listen, as they do now, to consideration of improved efficiency. Superheaters, brick arches, combustion chambers and feed water heaters are old. Their real application to our great problem came but six years ago, and they are only now beginning to be really used in this problem.

Today officials are reaching out for new things and old things in new application. They eagerly seek capacity increasing factors. Why? Because they are facing the question of increased weights in equipment and in operation. They need more power per unit, to do the world's business and do it economically.

Therefore young men never had the opportunity or the duty that they have facing them today.

Do they realize it? To try to make some of them see it is the object of these paragraphs.

Russell H. Conwell in his often repeated lecture, "Acres of Diamonds", tells how a certain Arab, whose mind had been powerfully affected by stories of the discovery of diamonds, sold his humble farm upon which he had passed his life and with the proceeds went out to hunt for diamonds. In the meantime after its former owner had spent all his money and died of disappointment, the largest diamond mine in the world was discovered on the very farm from which he had parted so lightly.

Dr. Conwell relates the same sort of story about the discovery of the oil deposits of Pennsylvania.

Are we to allow him or anybody else to tell how we also missed the great things that lie directly under our eyes?

RAILWAY CLUBS AND THEIR FACILITIES FOR THE DEVELOPMENT OF YOUNG MEN.

By Mr. G. M. Basford.

Let us make a little list of big possibilities to show what lies before young railroad men right now. These are chiefly locomotive items. They are mentioned at random, not in order of importance.

Boiler Design as a Whole

Size is only one part of this problem instead of being the chief feature as it has been considered in the past. It is now a question of balancing all factors to make and to absorb the maximum amount of heat per unit of weight. The day of ratios between grate area, heating surface and cylinder volumes has given place to a day of providing steam to produce definite amounts of cylinder horse power within defined limits of weight. This is revolutionary and the corraling of many a fractious heat unit must be made possible. This is your main line of activity in boilers.

Boiler Circulation

Many a bright mind is engaged in improving the movement of the water in the boiler with promise for the future. Very little positive information is available now upon this subject. Who will put us straight on the matter of boiler circulation?

Improved Grates

Grate design is now being studied as it never has been before. Experimental developments in grates as to air openings and grate construction promise valuable improvements in the near future. Conditions requiring maximum power lead to the conclusion that air openings through the grates should be as large as the character of the coal used will permit. Thirty percent is aimed at. Recognition is waiting for a thoroughbred grate expert. The largest Pacific type passenger engine has 47,500 pounds tractive effort and the same grate area that was used in the same service as it existed six years ago when the tractive effort was but 32,900 pounds. This problem is a worthy one for that expert. What is he going to do about it?

Ash Pan Design

This is a very vital factor in the production of heat. To provide air sufficient for intense combustion is the object of experiments now being conducted which promise simple solution of this problem. To provide air enough for a big firebox and put the air where it is wanted is no child's play. The speed of gases at a certain point in a big firebox, working hard, is 200 miles per hour. Who is the expert who will point the way to the ash pan design to supply air enough and how will he provide air openings in the ash pan sufficient to maintain atmospheric pressure in the ash pan at maximum rate of power development?

Combustion Engineering Applied to Firebox Design

The purpose is to attain, with all fuels, the highest degree of heat intensity per unit of firebox volume. Here is where the energy is developed. This is the heat factory. It is worthy of a life time study. Important developments are nearly ready to be announced. Your field is nearly 70,000 fireboxes.

Firebox Design With Relation to the Fire and the Flame

To burn the gases completely before they reach the flues and to accomplish this in the big firebox is another big problem. This involves grates, arches, air admission below and directly into the fire and mixing of the burning gases by division into small streams. It also involves the shape and size of the firebox and combustion chamber. All this is now being worked out on paper and in practice. Recent studies in firebox design recognizing the great importance of heat radiation and the relatively small importance of transfer of heat by convection have revealed the firebox problem in a new light. This will result in larger fireboxes, larger grates, larger combustion chambers and in new developments in the mixing of the burning gases by improvements in brick arches. Improvements already tried experimentally promise remarkable results. With all this to do, the field for combustion experts is very far from being over crowded. Before long 100,000 fireboxes will be in service to keep this country going. A little improvement applied to each of these will save a mountain of money.

Firebox Design in Relation to Its Own and to Tube Heating Surface

It is known that a certain sacrifice of tube heating surface for the benefit of increased firebox volume in the form of a combustion chamber is justified but how far should this be carried? This should be investigated. Then there is the question of tube length.

Front End Draft Appliances

Here is another field of promise. To produce the pump action necessary for draft with minimum back pressure load on the cylinders will bring great credit to the one who is successful in working it out. Why should front end construction that itself consumes 33% of the draft produced be perpetuated?

Detail Design

Developments in details to enable engines to run between shoppings with minimum running repairs present interesting possibilities. Shoes and wedges, journal boxes, hub liners, long driving boxes, improved throttles, lubrication, engine truck, trailing truck, tender truck design, also improved couplings of engines to tenders and radial motion for front and rear driving axles of long wheel base engines all have a bearing on this question.

Tender Design

Tenders may be said to have been somewhat overlooked in the speed of going to heavier and more powerful locomotives.

Labor Saving Devices

Here is a definite line for development which is well started in power reverse gear, power operated firedoors and grate shakers and coal pushers, also the greatest of all these devices the mechanical stoker. All these factors are needed because of the increased size of the locomotive. This renders it necessary to provide power auxiliaries to take the place of physical strength and endurance. Then locomotive operation becomes a matter of brain work rather than brute force.

Improved Valve Motion

Great strides in this direction in ten years give encouragement to the hope that there is more improvement to come. How crude the valve gear of the past would look on a big modern engine from the standpoint of convenience, let alone the question of economy in performance and the possibility of standardizing construction! Imagine yourself crawling under the wheels of a big modern engine to get at the eccentrics on the main axle!

Superheating

This improvement is by no means finished. Those who are living with this problem are in position to lead still further in their influence on cylinder performance and in the effective use of the heat from the firebox. Superheating engineers are ready to give higher superheat when railroads are prepared to use it by improvements in operation and maintenance. Great economies are available in higher superheat through increase in volume of the steam. These engineers are also ready to put to good use any increase of firebox temperature the combustion engineers can give them. Superheating, the greatest improvement the locomotive has ever seen, is not finished. It offers still greater possibilities when you are ready for them.

Feed Water Heating

This is now a factor in locomotive engineering and operation. It promises to take a place next to superheating in improving economy and increasing capacity with the incidental advantage of prolonging boiler and firebox life and reducing cost of boiler maintenance. Successful feed water heating means increased boiler power. It will permit of modernizing existing boilers of outclassed engines to render them available again in many cases for service which has outgrown them. Feed water heaters may be applied to existing engines under a charge to capital account and for a number of years will defer charges to operating account for replacing those engines by new ones. Feed water heaters will increase evaporation per pound of coal and provide economy not available in any other way because the improvement is made from otherwise wasted heat. Locomotive boilers should be relieved of the duty of heating water. It should come to them hot leaving only the evaporation to be effected in the boiler. Feed water heating is not new but successful locomotive feed water heating in this country has but just now been accomplished. A little later there will be more to be said on this subject. This development has been waiting for the successful heater.

Compounding

This principle is coming to its own. No locomotive improvement fills its natural field so well as when it is properly fitted into the general scheme of locomotive design as the compound feature is fitted into the Mallet.

Water Purification

This becomes more important every day. Before long people whose lives have been made miserable by water unfit to use in boilers of any kind will wonder why they ever used it in the most rigorous boiler service in the world. They will wonder why they ever paid the boiler repair bills of the past when the remedy is so easy and the returns so great. Let some of the young men tackle the problem of improving means and methods of water purification.

Brake Shoes

Do you remember any illuminating paper on the subject of brake shoes within a year or two before any of the clubs? Here is an inspiring, live, subject, this and the clasp brake. It would be specially appropriate for this club to record brake and braking progress as a whole in a fitting manner and tell the railroad world what it is missing and what it ought to do.

How about draft gear, wheels and a lot of other items?

Air Brakes

So great have been the improvements in means of stopping trains that the authorities of a few years ago have now new subjects to study if they would keep abreast of progress. The electric control and the automatic adjustment of braking power to load in addition to other improvements are distinctly revolutionary in their effect on the capacity of railroads as well as on the safety of travel. The capacity of some very important railroads is specifically a question of brakes. Do the railroads know what they ought to do next in air brakes?

Powdered Fuel

Herein lies a possibility of the use of heretofore impossible fuels with a $250,000,000 annual steam locomotive fuel bill to work on, also the possibility of increased steam making capacity and perfection of firebox operation that until recently were not hoped for. Increased hauling capacity and continuity of locomotive operation and eliminating of ash pit delay offer great promise for the future. Increased boiler capacity is a question of producing maximum calorific intensity per cubic foot of firebox volume. This is the raw material for the heating surface and superheater to work with. Speaking in general terms pulverized fuel will transform an 80 percent boiler into a 100 percent boiler. Consider what this would mean to say 30,000 locomotives in this country that are deficient in boiler capacity. Here again a capital charge will put from five to ten years of new life coupled with increased capacity into a lot of old power. It will put many an outclassed engine back on the main line. The chief reason for buying new engines is to get boilers that are big enough to haul maximum tonnage over ruling grades. Increased boiler capacity resulting from fuel efficiency is the question answered by pulverized fuel. It has already shown an evaporative boiler efficiency of 77 percent with pulverized Kentucky unwashed screenings as compared with 66.1 percent with lump coal from the same mine hand fired in the same locomotive.

Alloy Steels

If you could see confidential figures now in the desk of your speaker some of you would jump to the task of improving locomotive design with respect to lightening reciprocating and revolving parts of locomotives. This means making every pound of weight work for you. It includes possibilities in locomotives and tender design as well as parts of running gear. It is difficult to understand how the possibilities of improved use of a pound of weight rendered possible by improved detail design of running gear could have been overlooked so long. Your speaker has recently given three years to this study and is in position to state that there is an insistent need of brain work followed by action in this field. There is not a minute to lose in taking up the light part and counterbalance questions and the reduction of dynamic augment by improved designs and alloy heat treated steels.

Signaling

This has become a matter of speed control and increased capacity of track as well as a safety provision. Wonderful strides are being made in this field that are not widely known or well understood. Signaling is seldom mentioned before the railroad clubs. It will have an important effect upon the operation of locomotives in the near future.

Do you want more things to do? Then get into locomotive operation. Work out plans for keeping expensive engines in service a larger portion of the day. An average figure representing present practice is four hours nineteen minutes actual service out of a 24 hour day. Get into questions of organization, selecting, training and promotion of men. *Who will wake up the railroads to the suicidal policy of neglect of the selection of recruits and of training and promotion of these recruits in all departments?* Take up the question of railroading as a business with real cooperation of all departments. Take up transportation questions. Study suitability of locomotives to their working conditions. Who will show railroad managers how much money may be made in suitable roundhouses and in shops and shop equipment for maintaining big engines? No specific mention of the details of the car problems can be made on this occasion but the car offers opportunities that are little less important than those of the locomotive.

Have we succeeded in showing that there is something big for railroad clubs and for young railroad men to do? Will the clubs and the young men be assets or will they be liabilities in this case? Somebody will work out these problems. Will most of the railroads continue to leave improvement development to the supply concerns as they are now doing?

It lies in the power of young men in such organizations as The Railway Club of Pittsburgh to do magnificent service to the railroads to the people and to themselves. Today, as never before, no man lives to himself. Everyone depends upon others. Team work of inspired individuals is required as it has never been required before. The opportunities are greater than ever.

We have the locomotive the car and the railroad to work with. It is given tò no other class of men in the world to employ such factors as these in the interest of conditions that effect the welfare comfort and true happiness of millions of people.

This particular club has at its door the Pennsylvania Railroad with its magnificent record for ascertaining the facts of engineering and for their application to practice. The opportunity for this club is therefore specially great.

If the young men in audiences like this will do that which lies directly before them transportation will take the place to which it is entitled and every human interest will benefit. Because the task is so great and the promised benefits so immense there is no time to lose.

Our railroads owe a great debt to the Railway Clubs and other organizations of railway men. Largely to these organizations is due the credit for the greatest achievements in all railroad development the American locomotive and the American car. They have supplied the points of contact for many minds. While encouraging individual development they have discouraged fads. Many a new thought ultimately leading to important accomplishments has come from the inspiration of one of these gatherings. As records of progress the printed proceedings are valuable. They may be made more so. As an educational influence the associations present great possibilities. They have done great good. They have accomplished much, with comparatively little assistance and encouragement from the railway managements. They offer means for vastly greater achievement provided they receive the encouragement due them. If railway managements and if the young men in all departments will use the Railway Clubs as they ought to be used and if they will encourage those General Railway Clubs the Master Mechanics and Master Car Builders Association, railroad operation would be much easier and more profitable today. Much has been accomplished without help. Wonders would be accomplished with it. Young railway officials themselves may bring this about if they will embrace their opportunity.

Young men will find personal acquaintance with editors of the railroad publications most helpful in many ways. Your speaker owes a great debt to these men. It is good to know them. It is their business to be in the front rank of progress and they are always looking for ideas. They have discovered many able young men and have made their ability known to others. The executives of the Railway Clubs will also find these editors ready to cooperate in efforts to strengthen the work of the clubs.

Your speaker has a list of twenty men who have used the railway clubs to their own advantage and to the advantage of the clubs and their employers. These men are in commanding positions. One of them is the head of one of Pittsburgh's great industries. He attended meetings. He always spoke and he always thought of something worth while to say. He wrote papers and they were classics, the last word to date on his subject. He inspired himself and inspired others by being in and a part of every new mechanical development. He made friends and mixed in discussions in the corner of the room before and after the meeting when others told what they lacked courage to say on the floor. When he started to write a paper he found how much he didn't know of the subject and he fortified himself. He was never embarassed by an attack on the floor because he was always sure of his ground. Speaking in public was distasteful to him. He overcame this. He compelled himself to speak and thereby became one of our great men. He began as a Western Union messenger boy and succeeded largely because he acquired knowledge and because he used it and because he made it known to others. Without the railway clubs he might not be where he is today. I am sure he would not. If you would get the benefit of the club in your career, do as he did, take something of value to every meeting. Take more away from it. Suggest important subjects. Know something and become known in connection with it.

Praise the clubs all we may there is a lot for them to do to put themselves in the position of influence they ought to occupy. Every issue of the proceedings may be and should be a classic and it must be if a few young men will exert themselves and if the committee on subjects will select wisely.

No better advice can be given you than this. Become an authority on some important subject in railroad engineering or operation. Select the subject with great care and be sure it really is important and timely. Write a paper on it for the club or for the technical press. The very best way to learn is to teach. If you would know a subject write a paper upon it. This will identify you with a worth while improvement. You will begin to grow and will become known as a leader. One paper or one subject may not suffice but if you follow this suggestion thoughtfully the results will surprise you. This plan has worked wonders with a lot of young men who have consistently followed it. Your speaker is in position definitely to trace important promotions of more than one young man to excellent papers they have written for these clubs. Try it. It will help the club, it will assist the road you serve. It will strengthen the department you represent. It will advance you and it will inspire others.

Honors are awaiting the man young or old who will bring into the office of the treasurer of the road the beneficial results of a lot of well understood factors for increasing the capacity and improving the economy of the steam locomotive.

These suggestions do not involve sailing on uncharted seas. The courses are clearly laid. The speaker recommends that which many know how to do but few are doing. He suggests bringing the performance of the rank and file of locomotives up to the higher standard of the best locomotives.

Best locomotive records, reflecting up to date developments, show a water rate of 14.6 pounds per indicated horse power hour. What may be termed unimproved locomotives produce this unit on about 24 to 30 pounds. Between these figures lie great possibilities. Between them lies your opportunity. The majority of locomotives are in or near the 24 pounds class.

Honors await those who will bring every day practice of the 24 pounds class up to the higher standards set by individual developments.

Be awake! The sun is shining.

DISCUSSION.

PRESIDENT: Gentlemen, you have heard a most excellent paper. It is now open for discussion and I hope you will take part promptly. In order to get it going I will ask Mr. Walter V. Turner, Assistant Manager of the Westinghouse Airbrake Company, to open the discussion.

MR. WALTER V. TURNER: Mr. President and Members:—I do not know that I can say very much tonight, not because I have not the incentive or the enthusiasm to say it but because unfortunately I have got an abominable cold.

I want to say that I do not think a more valuable paper has ever been read before this Club. I believe if more of that kind of work was brought up some of the power that is in the Niagara Falls of a young man's life might be got out of it. I think it is a shame that there are so many young men who give to the world so little of their potential. Mr. Basford has led a lot of us up to the watering trough tonight. I wonder how many will drink!

I think the greatest trouble a manufacturing concern or railroad has today is to find the man for a job. Every one here thinks he could take anybody's job, of course, but it would take him ten years to learn to run the job after he got it. I have a lot of jobs I would like to hand out to somebody but there is nobody for them. Any one I might place therein would have to learn the job after he got it.

In 1832 a fellow resigned from the Patent Office because there was nothing more to do, there was nothing more to invent. A young man came to me about five years ago and said he thought he would resign. I asked "What is the trouble?" He said "I want to go somewhere where there is some development to be done, something to invent." I said "All right, if you can find any place better than the Air Brake ompany you are welcome to it and they will welcome you just as much." Since that time our concern alone has been granted something over 400 patents on air brake appliances. That poor fellow is starving to death for want of a job. How many young men figure that this electric light that serves us so well tonight, the telegraph, the wireless telegraph, the locomotive, and all the rest of our modern wonders with everything that they include, were here when Adam was created? And they were here thousands of years before the mind of man got very active. And now look at the revelations we see.

I gave a talk at the School of Technology at Syracuse on one occasion and a young fellow asked me what line of work he should go into, for everything seemed to be filled up. I told him the best thing he could do was to invent a megaphone, for that came about the nearest to his size. I was right. Why is it that you can't pump some life into a young fellow? A young man goes along and when he is 21 he knows it all. There is nothing more to do. A locomotive is a locomotive and a car is a car and an electric light is an electric light and that is all there is to it. He goes on a few years and wastes his time. Now I do not hold that a young man ought to have his nose to the grind stone all the time, but I deny that it is right for him to waste sixteen or eighteen hours in pleasure seeking and then go to work the next day to rest up. He doesn't do anything until he is forty because there are all kinds of pleasures. At forty he says "What is the use, it is too late." So I say that if it were possible to get out of the young men, or anybody else, what is in them, these recent improvements on locomotives would soon be things of the past. Not that locomotive design would be consumated, but the latest word in locomotives Mr. Basford speaks of would be a dead one.

There is a lot said in this country about all men being equal many of us say one has no right to draw $12,000 a year when we get only $5.00 a day, so we want eight hours work and ten or twelve hours pay to even up a little. There is only one thing in which we are equal and that is 24 hours a day in which to work. That is the only thing we have in common.

A lot of young fellows get the notion in their heads that because they have not a college or a technical education there is no use for them to try. I gave an address not long ago where

I was expected to say just what I thought was the greatest thing the faculty could teach a young man starting out in life, and I said "Teach him that a college education may be the greatest handicap in life." In a great many ways it is. You know you can educate a fool but you can not make a man. It is not knowledge that is power, it is the application of knowledge. Unless you apply what you have it does you no good. So it is with a college education.

The only remark which Mr. Basford made to which I might take exception, and I would not exactly take exception to it now, was in relation to money. I would not make money a consideration at all. I believe that working for money has killed more young men than anything else I know of. If they do not get a boost to $200 a month in a few weeks they quit the job for another, and so they keep on until it is too late to settle down. The only thing which will solve our big problem is not to strive for money, it is to work for the accomplished fact. Point out any man if you can who has done the big things of life, who did them for money! Of course money is a consideration with all people but if it is the incentive the big result is not accomplished. And I may say for myself, not that I have done any great work, but such as I have done and such fortune as I have accumulated, the fortune has been but incidental to my work which has involved the purpose to make two trains run where only one ran before.

What is the greatest inspiration I have had in my life? I think I would say the anecdote of Michael Angelo digging an angel out of a rock. One day a fellow saw him chipping away at a piece of marble, and he stopped to ask him what he was doing. He said "I am digging an angel out of this rock. There is an angel in here and I am digging him out." The fellow looked at him and shook his head with the comment "There is another crazy one." And his friends had all they could do to keep Michael Angelo out of the lunatic asylum. The angel he dug out is, as we all know, one of the masterpieces of sculpture. When I came to Pittsburgh I hailed from the west. My career here started with my affiliation with a club similar to this one which met in the rooms we have just left. I went down to Crafton and saw some big ugly ingots of iron that I had never seen before, and I thought to myself, in every one of you there is an angel and I am going to dig it out. I am going to transform these ugly pieces of metal to ministering angels which will serve humanity as long as the world endures. And thank God I have dug a few of them out. The example of Michael Angelo has been my inspiration. The mere fact that you have solved one of nature's problems is a reward far exceeding its money value. And if in addition it has brought growth, comfort and advancement to your fellow man it is something you have a right to be proud of. I hope that phase of Mr. Basford's paper will sink into the minds of these young fellows and be the motive power, the stimulus, the inspiration for achievements which we can now barely imagine as ever taking place.

I want to say just one more thing to you young fellows. It is better to have convictions and be wrong than not to have any convictions at all. I often try to drag out of the people around me the things they are convinced of, and it is the hardest thing in the world. I do not care whether you are right or wrong. Of course it is to be hoped that you are right, but it is far better to have wrong convictions and express them than to have none at all, or to be so doubtful about everything as to make no stand whatever. If the convictions are wrong somebody will take a shot at them and give you an opportunity to set yourself right, whereas, if they are right you can use them to set someone else right and in many ways make something of yourself. There is only one kind of person that neither God nor man has any use for, and that's a neutral—that lukewarm kind of an individual that God spewed out of his mouth—the "Tomlinson" of Kipling whom God didn't want and the devil wouldn't have.

If you are impersonally convinced that you are right on any subject, do not preface your remarks or written report by "It seems to me" or "The facts seem to warrant" or,—what is worse still—"I am inclined to believe", or any other of the similar fool remarks which take away the pith, point and value from your statements. These prefixes are only intended to supply a loophole for escape if perchance you are wrong. But just the same you expect your hearer or reader to transmute your "I am inclined to believe" into all the value of a fact, and to act upon it. If he does not you are sore or disgruntled because what you erroneously called your recommendations were not accepted.

As a matter of fact, who do you expect will accept a recommendation, etc. based upon "I am inclined to believe"? Generally it is accepted only by the waste-paper basket, or the "dead man's" file.

A good way to test how sure you are of what you say is to ask yourself if you are financially convinced that you are right. If you are willing to bet all you have, and all you can borrow on what you say, you can safely omit such weakening introductions as "It seems to me", "I am inclined to believe", etc., etc. When you use these you write your own death warrant as far as becoming anything except a "hewer of wood and a drawer of water."

Take hold of each part of Mr. Basford's paper, assimilate it, live it, and the locomotive will soon be a much more wonderful thing that it ever has been in the past.

PRESIDENT McNULTY: We have with us Dr. J. T. Holdsworth, Dean of the School of Economics, University of Pittsburgh. We would like to hear from him.

DEAN J. T. HOLDSWORTH: Mr. President and Members of the Railway Club of Pittsburgh:—I have no apologies at all to offer for coming into your assembly room tonight, except that I have never been here before. I know nothing whatever about the operating end of a railroad. I take it for granted that most of you men are operating men. I represent the School of Economics, the department of our University whose function it is to help young business men to improve themselves, to prepare for larger efficiency, to get ready to do larger things and to render more efficeint service. The watch words of the University are Service and Cooperation and the School of Economics aims to give every ambitious man the opportunity to raise his level by the systematic study of business principles and practices. The University is not a money-making institution. Tuition fees do not begin to maintain it. But we shall not have done our full duty until we let every young man in this Pittsburgh district know that here is the opportunity to get an education that will increase his efficiency, whether in the railroad's service or in any line of business whatsoever.

My specific purpose in appearing here by invitation tonight is to announce that this year we are offering in the Evening School of Economics of the University of Pittsburgh a special course in traffic and transportation which is intended primarily for every young man who feels that he does not know all that is to be known about railway and transportation matters and wants to know more. We have picked out the ablest man, the best-informed man on both sides of the transportation situation we could find,—Mr. John F. Lent, of the Lent Traffic Company, and President of the Commercial Club which meets in this room, to take the technical end of the subject and carry young men through so that they will be able much more efficiently to handle the jobs that are assigned to them in their departments and to get ready for promotion to bigger jobs. Mr. Lent will have the assistance of other members of the faculty and of railroad and traffic authorities.

We have an evening school where men who have an ambition to get on but who did not have the opportunity of a college education, may get what they lack. There is no exceuse for any young man in this region today falling down on his job; the opportunity for equipping himself for tomorrow's job, and that means a bigger job, is right here in the city of Pittsburgh.

I do not feel at all out of place as I look into your faces, because I think the reason you are members of this railway club is that you are interested in helping to advance the fine ideal that has been presented by the speakers this evening. So I have risen to assure you that the Evening School of Economics extends its service to you and to all men interested in higher business education. The course in Traffic and Transportation meets Thursday evenings each week from 7:45 to 9:45. Whether you enroll in that course or not you are welcome at any time.

Mr. President; I appreciate your courtesy in calling on me to speak.

PRESIDENT: Mr. A. D. Brown, Assistant to General Manager, P. & L. E. R. R., we would like to hear from you.

MR. A. D. BROWN: I have the honor to read to you this evening the comments of Mr. L. H. Turner on Mr. Basford's paper.

I have read with much pleasure and interest, Mr. Basford's paper on the facilities offered by the Railway Clubs for the advancement and development of our young men, and like everything else he does, it has been done most thoroughly.

There is an ambition in the minds of some of the members of the Railway Club of Pittsburgh to have an established home of our own some day, and we hope that the Club will be so situated financially, as to be able to keep two or three lecture rooms open two or three nights each week, in which different subjects will be lectured upon and illustrated for the benefit of the younger members of the Club, the young men in our large manufacturing plants and railroad shops. This should also be supplemented by classes in the lower mathematics and drawing, all of which would prove most advantageous to the young men enjoying these opportunities, and also to their employers.

Our business here tonight is to discuss the question of the advantages of the "Railway Club" to the young man, and in order to do so, it seems necessary to at least cross the line into sociological territory. It is believed that the year 1916 will go down in the history of this country as being most critical as to the relations between Labor and Capital, and one who has enjoyed the privilege of directing continuously for over forty years, the efforts of large numbers of men, should be pardoned if he has formed some positive opinions along sociological lines, and frowned upon if he has not. Whether comparisons are odious or not, well substantiated facts are stubborn things to combat. Twenty-five years ago, the common rate for a first class mechanic in the city of Pittsburgh was 27 cents an hour. There was little, if any difference, in the number of men reporting for duty on the morning after payday than any other morning during the month. The workmen were better workmen, their wives and children better fed and dressed, and their homes better furnished than they are today. It is true that the cost of living has advanced and will continue to advance, just as long as wages are being increased, but the trouble began because the wages advanced faster than the cost of living, and the difference between the two was spent in the purchase of whiskey by a deplorably large majojrity, and as long as the wages continue to exceed the cost of the bare necessities of life, just so long will the greater portion of the wage earners waste their surplus earnings, to the detriment of their families, and the destruction of their own health and usefulness.

Twenty-five years ago, locomotive firemen received $2.00 per day for 100 miles. They were required to keep their engines in good condition as to cleanliness, and assist their engineman in the inspection of their locomotives, also perform any light repairs necessary. Today, with nearly double the wages, and with their engines improved in every particular, with no cleaning to do, they feel it a great hardship to be required to put the coal into the firebox and fill the tank, when necessary, and today ten firemen are dismissed for violation of Rule "G" to one of twenty-five years ago. The boasted Prohibition laws and the enforcement of same, are a monumental farce. The speaker has reliable knowledge of one city, not far from Pittsburgh, of 18,000 population, operating under Prohibition laws, where there is more liquor hauled through its streets today than there was when the city had seventeen licensed saloons in full blast, and there has not been a prosecution since the law went into effect, but the slogan continues to be "Wipe the Black Spots off the Map."

Within six months, the speaker, in a spasm of charity, took a young chap about eighteen years of age, out of one of the city's Uplift Institutions, and found work for him at 22 cents an hour. Within sixty days after, a striker's committee had to be met, and prominent in the front row of the Committee, was the protege, who took a very active part in saying how much more wages must be paid, and how much less work they proposed to do for it, and so we might go on and relate for hours, the unjust conditions that have to be met, and for no other reason than that of placing too much money into the hands of men who have never had advice or training in the finer things of life, and in consequence, are as ignorant as children as to how to live and what is best for themselves and those dependent upon them and their employers.

If the future holds anything for this country, railroad managers, managers of large manufacturing concerns, and all employers of labor, both male and female, must awaken to the fact that if they want to better their own conditions, they must take the initiative and improve the conditions of others by taking the instruction of their employes out of the hands of the walking delegates, back rooms of saloons, and lodge rooms of Labor organizations.

There need be no fear of its being a too costly experiment. Money that is now spent in strike settlements, loss of business, wages paid to special deputies, (who in most cases are worse characters than the strikers themselves), might be invested in institutions, call them Y. M. C. A.'s if you like, but conducted largely under the direction of the company supplying them, where night schools are kept in session the year round, concerts and lecture courses to be attended at frequent intervals, bowling alleys, pool and other harmless amusements provided, and it would soon be discovered that your employes are deserting their old assembling places and coming to the places you have provided. It is working out in other cities, and should in Pittsburgh.

It must be conceded by all that the "Laborer is worthy of his hire" and he must be taught and made to understand the employer is also entitled to the labor he pays for. The laborer must also be taught that his interests and those of his employer are identical, and that one cannot thrive unless the other does. He must also be led up to the knowledge that the man who is sober, can read and write, understand the lower mathematics, can read a blue print, and above all, has a strong sense of justice, as to what his own and his employer's rights consist of, will always have a job, while the drunken and ignorant individual can be found in the bread line. He must be led up to the knowledge that two laws were created at the beginning of all things, that they are eternally active, and cannot be repealed. They consist of the law of Supply and Demand, and the Survival of the Fittest. If there is no work to be done, all the walking delegates or labor organizations ever appointed or created, cannot get a man a job. If there is more work than men, the demand for men makes the prices of labor. The second law is similar. The strong overcome the weak—the wise lead the foolish, and in the reduction of the force, the sober and loyal employe holds the job while the agitating drunk gets the blue envelope.

Any director of men will tell you that he can produce more with 100 sober, active and intelligent men than he can with 300 drunken, trouble makers—then why not get busy and make the 100, and you may depend upon it that they will assist greatly in making more.

If the United States of America aspires to be a world power, a Banking House for all nations, and a store house for the world, it must take advantage of its present opportunities, and unless it takes immediate steps to overcome its greatest obstacle, namely, its labor supply, all other efforts will be useless, and the only method by which this can be brought about, is by the education of the masses, not by technical training in the arts and sciences, but by being taught how to live, how to care for their families, and educate their children, how to save their money and buy their homes, and to become intelligent, self respecting citizens, and above all, cultivate a love of justice and fair dealing between man and man, and with a labor supply of these qualities, our country and our people would command the respect and admiration of all nations.

PRESIDENT: Mr. Roy V. Wright, Managing Editor of the Railway Age Gazette is here and we would be glad to hear from him.

MR. ROY V. WRIGHT: Mr. Basford's papers are always good. With a remarkable foresight he keeps so far ahead of the rest of us that we are lost trying to keep in sight of him. About 14 years ago he presented a masterpiece on apprenticeship before the Master Mechanics Association. Mighty few of us managed to get any idea of what he had in mind. I hope it will not take us as many years to catch up with a few of the things he has brought us tonight.

The Railway Club of Pittsburgh is very dear to my heart. I left Pittsburgh twelve years ago and I am in good standing with the Club today. Why? Because of the great good the Railway Club of Pittsburgh has done to me. I remember in my senior year in college we had a wise professor who said this: "Young fellows, you are going out into the world and you don't know a thing. You are not fit for anything. You have got to get busy and make something of yourselves. Remember this, that you have got to advertise yourselves. The store keepers, the manufacturers, can advertise in the advertising columns of the technical magazines and newspapers. You can not do that, as an engineer or as a young man. But you can advertise yourselves far better; you can get into the reading pages of the papers, into the proceedings of the technical clubs, and that is the finest space, the space that can not be bought. It is up to each one of you, if you are going to make good, to advertise yourselves by being active in railway clubs and technical associations and by writing articles for the technical papers." Mr. Basford with his long experience can testify that that is absolutely true.

The Railway Club of Pittsburgh started in a small way. At its first meeting the committee did not have much of a chance to get papers and we had Colonel Jones talk about the fight down at Santiago. And Mr. Simons, who was a member of the Executive Committee, at the last minute was notified to fix up something and he fixed up this little paper of which Mr. Basford has spoken.

When it came to the second meeting they were not much better off. Mr. Turner called in his mechanical engineer and told him he had to prepare the next paper. I said, "I can't do it, I have more than I can do now." Mr. Turner replied to me—"I am the boss here, get busy." There was my opportunity. As a young cub only a few years out of college I got busy. I am frank to say that I did not know much about the thing I wrote about. It was the steam indicator in its application to the locomotive. There was one thing I did learn and that is how little I did know about it. We even put indicators in a couple of engines and got busy with them. I went out to the Carnegie Library and studied the subject up night times. And my wife of just a few weeks helped me put the paper together.

The paper did not amount to much and I knew it better than anybody else. Yet for years when I went to conventions or travelled on the road men I met would say, "You are the chap who wrote the article for the Railway Club of Pittsburgh." I can directly trace many cases where it made an entree for me into situations I could not otherwise have got into, and I know very well the value of that piece of work. I mention this because I think I was the first young man in this club that got on the floor. That was fifteen years ago. I say this for the encouragement of you young fellows. You may not have any one to kick you into it the way Mr. Turner kicked me in, but if you are afraid simply go and ask your boss to kick you into it. It is the best thing you can do.

PRESIDENT: May we hear from Mr. J. G. Code, General Manager of the Wabash Pittsburgh Terminal Ry.

MR. J. G. CODE: "Has any old fellow got mixed with the boys? If there has put him out without making a noise." I am thinking of that quotation in connection with the age limit that Dr. Holdsworth applied in his talk. Every member of this Club may consider himself a boy and we have listened to some very good suggestions tonight. And the one point of cooperation is what led me to make the suggestion of the transportation committee. It is not going to serve very much in railway operation if you perfect the superheater or the feed water heater or the air brake etc. unless you can get cooperation in all departments to enable that locomotive so developed to do the work for which it is intended in moving freight economically. You will have many things to study, in organization in methods of keeping the various departments working together, in providing proper shop equipment to keep the locomotive in service, or else there is a large waste of capital in it. Every department of the railroad must work together in order to get efficiency, for which you are only building the foundation when you accomplish all of these possible improvements to the locomotive. If you are only getting four or five hours actual haul out of that locomotive in twenty-four it has not done a great deal of good to develop its efficiency to the extent you have.

The main point of the discussion tonight however is the development of the efficiency of the man. And every member of this club is adding something to his efficiency by participating in the discussions, attending these meetings and studying the proceedings.

PRESIDENT: Mr. J. G. Haynes, Master Mechanic of the Montour Railroad, is here representing Mr. Stark.

MR. J. E. HAYNES: Mr. President and Gentlemen; I am not in condition to speak very much this evening.

I am in the same position as Mr. Wright was when he was told to give his first paper before this Club, by Mr. L. H. Turner. My Boss gave me orders to get into this discussion, so its get in.

I remember reading some time ago, with a great deal of interest, what Mr. G. M. Basford said in the discussion of a paper read at the Master Mechanic's Convention, namely. The past generation and the present have brought a tremendous growth to all our organizations, the extent of which, none of us probably fully realize.

We have a greater need than ever, for trained young men, ready to be trusted with big responsibilities, and as I reread Mr. J. F. Deems Presidential address before the 1907 meeting of the Master Mechanic's Association, I could not refrain from bringing this message to you.

I will ask Mr. R. V. Wright to read it for me.

MR. WRIGHT: Yes, this is an extract from Deems' address and it is really mighty good.

"No war-bronzed veterans ever had deeper inspiration or greater cause for self-forgetful devotion than had the pioneers who bore the brunt of the early days of the development which this Association has so splendidly advanced. All the honors accorded to military achievement in the past, but illy compare with those which the future will gladly erect to the memory of the men who have given us that grander, that more useful development—transportation—without which today the world would be largely a waste. Our predecessors met in a small way and singly the problems which we and those who follow us must meet collectively and in a larger sense, and to solve which it will be necessary to form great combinations that must be harmonious, cohesive and permanent. It is no slight task to conceive and build a structure that will provide for the interchange of people, the mutation of ideas and the physical distribution of that which enters into man's every need. We are fortunate in that our fathers built so well, let us hope that those who follow can truly say the same of us; let us devote ourselves seriously to the problems of today; the chief among which is to try to do as well the things that come to our hand as our predecessors did with the smaller things that come to their hands.

A legacy has been bequeathed us, a legacy for which all preparation has been made, a legacy of opportunity which looms large in the future and awaits with rich reward the man who is prepared—*the man who is prepared.* We have received; what shall we give? We have inherited; what shall we bequeath, what shall we leave to aid in solving the problems of the future, many of which may be much more perplexing than those we are called upon to solve today? We may work in brass and steel, and leave the most perfect mechanism—we may develop and improve and evolve methods and practices until nothing more can be desired—we may reach perfection in all these, in mechanism, structure and method, and yet our bequest be a failure and itself a burden unless we provide that which is paramount, which is over and above the sum total of all of this, and for which, even today, events throughout the world are crying aloud—*the man.*

A man prepared, experienced, earnest, hopeful and happy, consecrated to his work, ready to the hand of the future.

This, my friends, as I see it, constitutes our greatest opportunity, our most imperative, our most sacred duty. If the man is provided, the machine will cease to be a burden and methods will come forth as the buds at the kiss of spring. *Our own future, and the hope of that larger future which lies beyond, depends on our efforts and our success in providing those who are to help us today, and upon whom at no distant day must fall our duties, our opportunities, our honors and our failures.* Have we any greater, grander, more sublime obligation than this? Can we justify a pride in our life-work, if we fail in this? If I can but bring to you this single message, if I can inspire you with this one thought, I am content."

PRESIDENT: Mr. Willard A. Smith, Editor of the Railway Review.

MR. WILLARD A. SMITH: I deem myself fortunate in being here tonight. My flues are considerably choked up with a bad cold but if anything will clear them out it is the inspiration which I get from a meeting of this kind.

Young men for vision; old men for dreams. Dreams at night, as you know, are mostly made up of a hodge podge mixture of our past lives. The vision is a dream of the day time, a looking forward, just such as Mr. Basford was presenting to you tonight. The young man of vision is the man who is going to make his mark in the world, the man who is going to make something of himself and do things for mankind. The man of vision, the man who is thoroughly in earnest, the man of observation, will make his own way in the world. Mr. Walter V. Turner I take it did not mean to exclude money making from the objects for which we should work, but rather to say that if we will attend to the more important things of making ourselves efficient as we ought to be and be as much of a power in the world as we ought to be, the money will take care of itself. And after all the farther one gets along in life the more he sees of how little value money is beyond a certain point. There is no joy in life equal to the joy of achievement. When you come to your old days and look back over your life, it will not be the fact that you have made big money that will rejoice you nor that you had such a good time; but it will be that you accomplished certain things worth doing. The man who does things is the man who gets there and who is of value to the world.

I can understand what Mr. Basford feels and what Mr. Turner feels. I do not know how much of this world's goods they have accumulated, but I know there has been a certain persistence running through their lives which has been their controlling impulse and which has meant everything to them and to those with whom they came in contact.

The field is growing wider. The more of the world we conquer the more there is to conquer. Didn't we all think fifteen years ago that the air brake was a very perfect apparatus? How much has come into that field since Mr. Turner appeared. Didn't we think over five or six years ago that the locomotive had reached its highest grade of perfection and that it would be superseded by other power. Now what a field is open to us. Mr. Basford has shown you a thousand and one things about a locomotive which demand your study and which offer you a field for achievement. You can take that simple, ordinary thing, a box car, and say just the same thing about it. A simple box car on eight wheels is one of the greatest bundle of problems in the world, and they are problems that have not been fully met, and the problems are exceedingly difficult.

We point to the automobile field as one in which there has been wonderful achievement, and there has; there has been no such study put on the locomotive as there has on the automobile. The other day I noticed that Mr. Ford, of automobile fame, has issued a challenge to the railroad world. He says that the freight car of today is practically an abortion, a combination of all that is bad, bad material, bad design, bad workmanship, made far too heavy for the load it is to carry, pounds itself to pieces and ruins the track. Mr. Ford proposes to furnish a car which will meet all the conditions with half the dead weight carrying twice the load. To propose is one thing, to accomplish it another. There are two million and a half freight cars in this country that cannot be wiped out in a minute. They cannot be in the charge of an expert chauffer all the time. They have to go out in the world and take their chances with each other. These problems to which men are just beginning to give attention, somebody will solve. The rate of progress goes on with tremendously increasing velocity. You younger men will in time look back and realize these things as some of us have who have been longer in the field. I thank God my vision has not been dimmed. If I desire to live many more years it is that I may carry out the things that I know are coming in this wonderful world of ours.

We are living, we are dwelling
In a grand and awful time.
In an age on ages telling.
To be living is sublime.

You young men have an opportunity greater than any of your predecessors ever had, and the responsibility upon you is just that much greater. See to it that you do as well as those who have made their mark on their time. Thank God for the vision to see what you are going to see. If you get the inspiration you can inspire your superior officers; you can make them see that problems which they do not yet understand are real problems and the solution of those problems is the solution of their own great problems of making a success of the properties which they serve. Everything that tends to improve railroad operation is a patriotic service. I addressed some school children one day on Washington's birthday. The most of them were foreign born and I took great pleasure in getting into their minds that they had a duty as citizens. What is that duty? Simply to vote and take part in political meetings? I said, "The duty of every individual citizen to his country is to make the most possible of himself."—that potential which dwells in every one of them as Mr. Turner has so well said. The man who makes the most of himself will do the best work possible for his country.

I had not anticipated speaking. I enjoyed what the other speakers have said, with all of which I am in perfect accord. I only wish I had many more years of vigor and the same insight and vision which I have today. If there is one thing that I am glad to have lived for it is that I did certain things in my life which were of benefit to other people and to the public, although they did not "put money into my purse."

PRESIDENT: Are there any other remarks? If not I will ask Mr. Basford to close the discussion.

MR. BASFORD: I will not take time to say more than to express my personal appreciation of the inspiration which I have received myself from the speakers who have taken part in this discussion.

MR. L. H. TURNER: The condition related by Mr. Wright as to our difficulty in securing good papers and good discussions at the time of the organization of the Club, has continued up to the present.

We should realize that in order to make the Club useful, and popular, that we should make every effort to secure first class papers on live subjects, and personally, I am in favor of furnishing the members with printed copies of the papers to be read, in order that they may come here prepared to discuss them, but I also believe that it will be of much profit to the younger members if a half dozen or so were selected each month to discuss the papers, and have them notified in time so that they could prepare themselves in order that when the meeting opens, we are sure of a good paper and a good discussion.

It is only in this way that our methods can be made interesting, and only in this way can we take first place as the most useful club in the country. However, a happy condition has followed the presentation of papers at our meetings, from the fact that we seem to be getting better ones right along. This would place the paper offered by Mr. Basford tonight as being the leading one up to this time, and from the many suggestions that he has so wisely made for us, there is no reason why our next paper should not be better than the one offered by Mr. Basford. I am sure that he will take as much pride as any of us in knowing that he has assisted so much in the improvement of our meetings, and for the splendid paper that he has given us tonight, and the fine discussion it has brought out, I wish to offer a resolution that we give him a standing vote, expressing our sincer thanks, and with it, the hope that he can make it convenient to meet with us often.

The Motion prevailed by unanimous vote.

J. B. Anderson
Secretary.

MEETING OF SOCIETY OF RAILWAY CLUB SECRETARIES

June 17, 1916, Atlantic City, N. J.

The Society of Railway Club Secretaries met in annual session, Saturday, June 17, 1916, at the Marlborough-Blenheim, Atlantic City, N. J., Mr. A. J. Merrill, Secretary of the Southern & Southwestern Club, Chairman, of the Society, presiding.

Other members present were:

New York Railroad Club—Mr. Harry D. Vought, Secretary,

Central Railway Club—Mr. Harry D. Vought, Secretary-Treasurer,

New England Railroad Club—Mr. William E. Cade, Jr., Secretary,

The Railway Club of Pittsburgh—Mr. J. B. Anderson, Secretary,

Canadian Railway Club—Mr. James Powell, Secretary.

Regrets were received by Mr. B. W. Frauenthal, Secretary of the St. Louis Railway Club and Mr. F. O. Robinson, Secretary of the Richmond Railroad Club, the latter's absence being due to the critical illness of Mrs. Robinson.

The Minutes of the annual meeting of 1915 were approved.

Following an interchange of opinion as to the desirability of continuing the method of publishing and distributing the Index of Subjects compiled by the Society, it was unanimously agreed that a change would be advantageous to the Clubs represented, and a measure of economy would be assured by thus obviating the expense of mailing the Index to members of the Clubs.

It was, therefore, further agreed by unanimous vote that in future the Index be compiled as formerly by the Secretary-Treasurer, but its publication be confined to the September Official Proceedings of each Club, in connection with an abstract of the Minutes of the Annual Meeting of the Society, if approved, by the Executive Committees of the Clubs, which would insure the material being received by every Club member, make it convenient for ready reference, and obviate the further expense of distribution of the booklet heretofore issued to each Club Secretary, the total number having increased from its original figure to close to 8,000 copies.

It was further decided to continue, with the approval of the Club Executive Committees, the publication in each issue of Club Proceedings, of subjects and authors for various meetings, as it had met with favor during the past year owing to the advance informtion afforded Club members of the topics to come before Sister Clubs.

The Society of Railway Club Secretaries being sponsor for the organization of the Society of Technical Associations Secretaries, and its growth and development having exceeded expectations, and the benefits afforded being equally advantageous, it was unanimously agreed, after discussion of the proposition, that a group membership for railway club Secretaries should be sought, the annual dues to be paid out of the treasury of their Society.

The Secretary-Treasurer was directed, on motion of Mr. Powell, to conduct the necessary arrangements for application, etc.

It was the concensus of opinion that the result would favor improved service and efficiency by the secretaries to their respective clubs through what had already developed in the work of the larger organization and the corresponding advantages accruing from affiliation and participation therein.

The matter of the withdrawal of the Western Railway Club from the Society which had been laid upon the table when received, was again taken up and an agreement reached that efforts to induce the Western Club to reconsider its action having been without avail, the resignation should be accepted and all interchange of relations discontinued, the Secretary-Treasurer to advise the President of the Western Club, personally, for his information and the members of his Executive Committee, of this action and of the reluctance and regret with which it had been compelled.

On motion of Mr. Powell, it was decided that, in future, the annual meetings of the Society of Railway Club Secretaries shall be held at 11 A. M. and followed by an informal family luncheon, to which each Secretary would be privileged to invite the President of his Club, or, in his absence, the next ranking officer present, to attend as a guest of the Society, for a round table conference of activities helpful to the Clubs.

Mr. Cade reported that the New England Club had appointed a Committee to report on various phases of the subject of "Preparedness" which was instructed to seek the cooperation of all other Clubs and ask them to appoint like Committees with a view of having joint action.

Consideration was given to a recommendation from a member of a railroad club that clubs use a specific paper simultaneously in a given month. It was rejected as impracticable and likely to detract from the interest in meetings that is now so well sustained.

In a general welfare discussion following the regular order of business, all the Secretaries voiced the opinion that in their annual interchange of experiences, methods and practices, as well as suggestions and opinions, it was a fair assumption that they had never failed to evolve something of practical benefit, because, while their action was always to be treated as recommendatory and was taken with full regard to deference due their superiors, approval has always been cheerfully accorded by the Executive Committees of the various Clubs.

On motion of Mr. Anderson payment of bills by the Secretary-Treasurer for the current expenses of the Society was authorized and the officers continued for another year, as follows:

Chairman—Mr. A. J. Merrill, Atlanta, Ga.

Vice-Chairman—Mr. William E. Cade, Jr., Boston, Mass.

Secretary-Treasurer—Mr. Harry D. Vought, New York City.

Respectfully submitted,

HARRY D. VOUGHT,
Secretary-Treasurer.

INDEX OF
PAPERS AND THEIR AUTHORS

Presented Before Railway Clubs During the Season 1915-1916

Compiled by the Society of Railway Club Secretaries

NEW YORK RAILROAD CLUB

Harry D. Vought, 95 Liberty Street, New York City, Secretary

September 17, 1915—"The Freight Terminal." By *Mr. C. M. Himmelberger, Superintendent, Raritan River Railroad.*

October 15, 1915—"The Value of Motor Cars on Railroad Systems." By *Mr. W. R. McKeen, of Omaha, Neb., Consulting Engineer, Motor Cars, Union Pacific Railroad.*

November 19, 1915—"The Railroads and National Defence." By *Mr. George D. Snyder, Deputy Chief Engineer, Hudson & Manhattan Railroad.*

December 17, 1915—No paper.

January 21, 1916—"Recent Developments in Brake Engineering Principles and Practice." By *Mr. S. W. Dudley, Chief Engineer, Westinghouse Air Brake Company.*

February 18, 1916—"Pulverized Fuel for Locomotives." By *Mr. John E. Muhlfield, President, Locomotive Pulverized Fuel Company.*

March 17, 1916—"Synopsis of the Report of the Chicago Association of Commerce Committee on Smoke Abatement and Electrification of Railway Terminals." By *Mr. George Gibbs, Consulting Engineer.*

April 21, 1916—"Sanitation of Passenger Cars." By *Dr. Thomas R. Crowder, Director of Sanitation and Surgery, Pullman Company, Chicago.*

May 19, 1916—"Lighterage." By *Mr. Henry L. Joyce, Manager, Marine Department, Central Railroad Company of New Jersey.*

CENTRAL RAILWAY CLUB

Harry D. Vought, 95 Liberty Street, New York City, Secretary-Treasurer

September 21, 1915—"Rivers and Canals." By *Mr. William Elmer, S. M. P., Pennsylvania R. R., Buffalo, N. Y.*

November 12, 1915—"Rubber from Tree to Factory." By *Mr. Walter C. Mullett, Secretary and Treasurer, Hewitt Rubber Company.*

January 14, 1916—"Yard Operation." By *Mr. J. R. Hamilton, Terminal Trainmaster, D. L. & W. R. R., Buffalo, N. Y.* "Modern Engine House Facilities and Methods." By *Mr. J. H. DeSalis, of Syracuse, Chief R. F. of E., N. Y. C. R. R.*

March 9, 1916—"Annual Report of Standing Committee on M. C. B. Rules of Interchange."

May 12, 1916—"The Modern Superheater and its Performances." By *Mr. S. S. Riegel, M. E., D. L. & W. R. R.*

ST. LOUIS RAILWAY CLUB

B. W. Frauenthal, Union Station, St. Louis, Mo., Secretary

June 11, 1915—"The Missouri Department of Labor." By *Mr. John T. Fitzpatrick, Commissioner, Bureau of Labor Statistics, Kansas City, Mo.*

July 9, 1915—"The Industrial Terminal." By *Mr. Frank A. Spink, Traffic Manager, The Belt Railway Company of Chicago, Chicago, Ill.*

August 13, 1915—"The Railroad—A Public Servant." By *Mr. W. E. Williams, General Manager, Missouri, Kansas & Texas Railway, Parsons, Kan.*

September 10, 1915—"The Story of the Telegraph." By *Mr. W. H. Spain, District Commercial Manager, Western Union Telegraph Co., St. Louis, Mo.*

October 8, 1915—"Locomotive Coal Consumption." By *Mr. Lawrence W. Wallace, Professor of Railway and Industrial Department, Purdue University, Lafayette, Ind.* "Successful Ways and Means of Developing Railroad Territory on

Agricultural Lines." By *Mr. H. B. Fullerton, Director of Agricultural Department of the Long Island R. R. Co., Medford, Long Island, New York, N. Y.*

November 12, 1915—"Construction of the Roadbed and of the Track." By *Mr. E. A. Hadley, Chief Engineer, Missouri Pacific Railway, St. Louis, Mo.* "Pleasant Valleys and Rock Mountains." By *Mr. W. B. Leffingwell, Official Lecturer, Union Pacific Ry., Chicago, Ill.*

December 10, 1915—"How Can Folders Be More Economically Distributed and Their Efficiency Increased?" By *Mr. B. W. Frauenthal, General Ticket Agent, Union Station, St. Louis, Mo.*

January 14, 1916—"Useful Personality." By *Mr. Vincent L. Price, Vice-President, National Candy Co., St. Louis, Mo.* "The Congested District of St. Louis." By *Mr. Clair E. Ames, Secretary of the St. Louis Federation, St. Louis, Mo.*

February 11, 1916—"The Empty and Load Freight Brake." By *Mr. Walter V. Turner; Manager, Westinghouse Air Brake Co., Pittsburgh, Pa.*

March 10, 1916—"The Public and the Railroads." By *Mr. W. L. Park, Vice-President, Illinois Central R. R., Chicago, Ill.*

April 14, 1916—"The Economic Value of East St. Louis to the St. Louis Industrial District." By *Mr. Tampton Aubuchon, Secretary, Association of Commerce, East, St. Louis, Ill.*

May 12, 1916—"The Public Carrier and the Wage Scale." By *The Hon. Charles Nagel of St. Louis, Mo.* "Recent Progress in Testing Wood Used by the Railroads." By *Mr. Howard F. Weiss, Director, Forest Products Library, Madison, Wis.*

THE RAILWAY CLUB OF PITTSBURGH

J. B. Anderson, 207 Penna. Station, Pittsburgh, Pa., Secretary

September 24, 1915—"Transportation in Alaska." By *Mr. W. R. Crane, Dean, The School of Mines, The Pennsylvania State College.*

October 22, 1915—No paper.

November 26, 1915—"Workmen's Compensation." By *Mr. W. S. Diggs, Chairman, National Council of Insurance Federation.*

December 21, 1915—"The Life of a Steel Freight Car." By *Mr. Samuel Lynn, Master Car Builder, P. & L. E. R. R.*

January 28, 1916—"Fuel Economy." By *Mr. H. C. Woodbridge, Assistant to General Manager, B. R. & P. Ry.*

February 25, 1916—"Malleable Iron—Its Use and Abuse." By *Prof. Enrique Touceda.*

March 24, 1916—"Annual Report of Standing Committee on Revision of M. C. B. Rules of Interchange." By *Mr. R. L. Kleine.* "Method of Handling Repairs to Foreign Cars and Billing for Same." By *Mr. E. S. Way, General Foreman M. C. B. Clearing House, Penna. R. R.*

April 28, 1916—"Locomotive Inspection Laws and Rules." By *Mr. Frank McManany, Chief Inspector, I. C. C. Division of Locomotive Boiler Inspection.*

May 26, 1916—"The Activities of a Railroad Test Department." By *Mr. C. D. Young, Engineer of Tests, Penna. R. R.*

RICHMOND RAILROAD CLUB

F. O. Robinson, Eighth and Main Streets, Richmond, Va.
Secretary-Treasurer

September, 1915—No paper.

October, 1915—"The Principles of Railroad Signals." By *Mr. Harold McCready, of the Union Switch & Signal Co.*

November, 1915—No paper.

December, 1915—"The Development of Tubes." By *Mr. C. F. Roland of The National Tube Co.*

January, 1916—"Transportation Problems in Alaska." By *Mr. W. A. Crane, Dean, The School of Mines, Penna. State College.*

February, 1916—"Electric Traction of N. & W. Ry." By *Mr. C. H. Quinn, Chief Electrical Engineer, N. & W. Ry.*

March, 1916—"The Proper Handling of Passenger Trains." By *Mr. Robert Burgess, Westinghouse Air Brake Co.*

April, 1916—"How Can the Efficiency of the Supply Department be Determined?" By *Mr. H. C. Pearce, General Purchasing Agent, Seaboard Airline Ry.*

May, 1916—"Cab and Signal and Automatic Stop," including exhibit of Ramp Rail and Wireless Train Control. By *Mr. Stephen Smith, G. M., The Julian-Begg Signal Co.*

CANADIAN RAILWAY CLUB

James Powell, Box 7, St. Lambert, near Montreal, Secretary

September 14, 1915—"Hydraulic Presses versus Power Presses."

May 11, 1915—No paper.
By *Mr. W. Rodger, A. M. Can. Soc. C. E., Elevation*

October 12, 1915—"Electric Lighting of Railway Passenger
Draughtsman, Canadian Pacific Ry., Montreal.
Cars." By *Mr. E. S. Macnab, Engineer of Electric Car Lighting, Canadian Pacific Ry., Montreal.*

November 9, 1915—"Rubber as Related to the War." By *Mr. A. D. Thornton, Tech. Supt., Canadian Consolidated Rubber Co., Montreal.*

December 14, 1915—"Pure Iron." By *Mr. J. T. Hay, Director of Research, Stark Rolling Mill Company, Canton, Ohio.*

January 11, 1916—"Processes of Manufacturing Seamless Steel Tubes." By *Mr. J. J. Dunn, Gen. Supt., Shelby Steel Tube Co., Pittsburgh, Pa.*

February 8, 1916—"Improvement in Passenger Car Construction and Design." By *Mr. K. F. Nystrom, Chief Draughtsman, Car Department, Grand Trunk Ry., Montreal.*

March 14, 1916—"Heat Treatment of Steel." By *Mr. G. W. Pressell, Metallurgist, E. F. Houghton & Co., Philadelphia, Pa.*

April 11, 1916—"The Railways of India." By *Mr. S. J. Sarjant, M. I. C. E., late Locomotive Superintendent, Great Indian Peninsula Railway.*

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB

A. J. Merrill, Box 1205, Atlanta, Ga., Secretary

July, 1915—"Superheater on Mikado Type Locomotive in Freight Service." By *Mr. R. B. Van Wormer, A. C. L. R. R., Waycross, Ga.*

September, 1915—"Oxy Acetylene Welding." By *Mr. M. H. F. Koch, Atlanta, Ga.*

November, 1915—"Locomotive Inspection." By *Mr. Frank McNanamy, Chief Inspector, I. C. C. Division of Locomotive Boiler Inspection, Washington, D. C.*

January, 1916—"Practical Chemistry of Combustion." By *Mr. A. G. Kinyon, S. A. L. R. R., Portsmouth, Va.*

March, 1916—"Proper Handling of Passenger Trains." By *Mr. Robert Burgess, Westinghouse Air Brake Co., Atlanta, Ga.*

May, 1916—"Advancement of Postal Car Construction and Lighting." By *Mr. Charles H. Otis, Chief Clerk, Railway Mail Service, Chicago, Ill.*

THE ANNUAL MEETINGS OF THE SOCIETY ARE HELD IN CONNECTION WITH THE CONVENTION OF THE M. C. B. AND A. R. M. M. ASSOCIATIONS.

Chairman, A. J. Merrill, *Southern & Southwestern Railway Club*

Vice-Chairman, W. E. Cade, Jr., *New England Railway Club*

Secretary-Treasurer, Harry D. Vought, *New York and Central Railway Clubs, New York City*

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of September, 1916, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—"Construction of New Subways for New York City," by Robert H. Jacobs.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—(Unknown).

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.

SUBJECT—"Railway Scrap or Salvage" by E. J. McVeigh.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.

SUBJECT—"Hudson & Manhattan Subaqueous Tunnel System."

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—(To be selected by speakers).

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.

SUBJECT—"Boiler Repairs by Oxy-Acetylene and Electric Welding," by D. M. Pearsall.

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.

SUBJECT—"Train Rules and Train Dispatching," by J. F. Mackie.

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

SUBJECT—"Railway Clubs and Their Facilities for the Development of Young Men," by G. M. Basford.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

In Memoriam

H. J. SHOOK
Died, November, 1915

S. R. WILSON
Died, June 9, 1916

J. M. JAMES
Died, September 17, 1916

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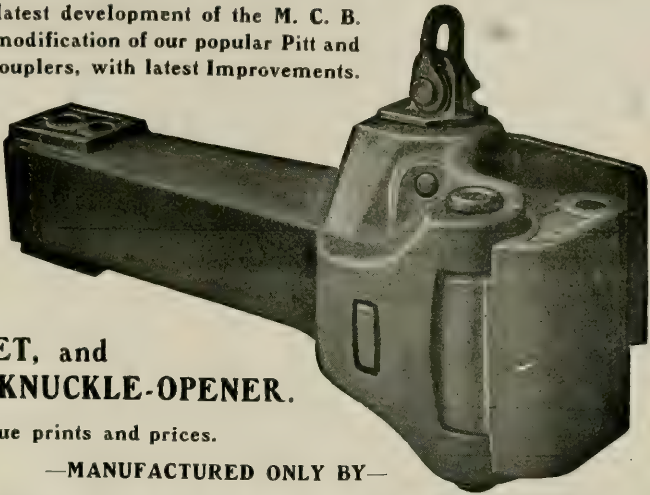

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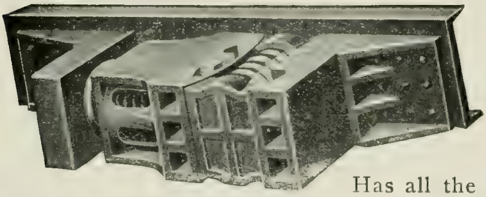

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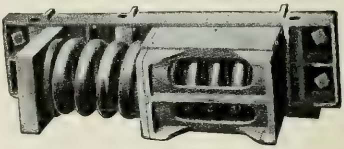

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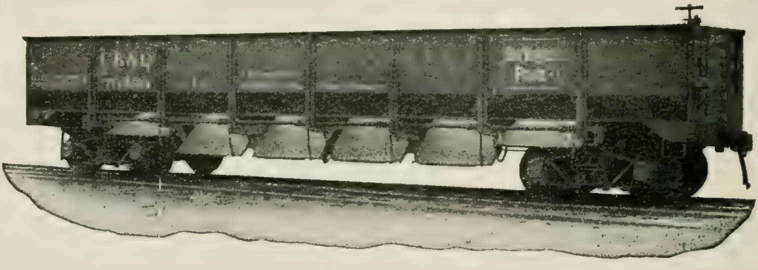

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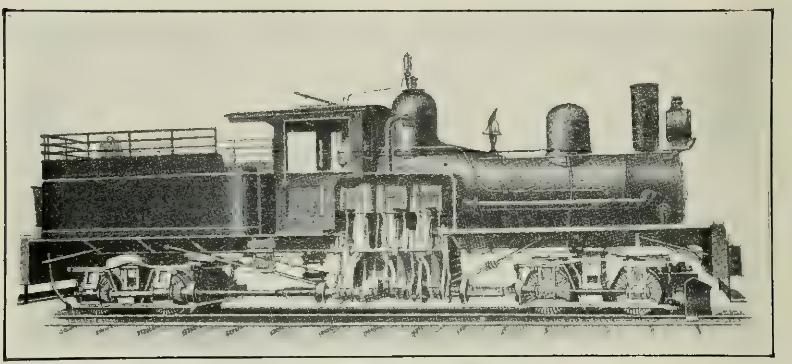

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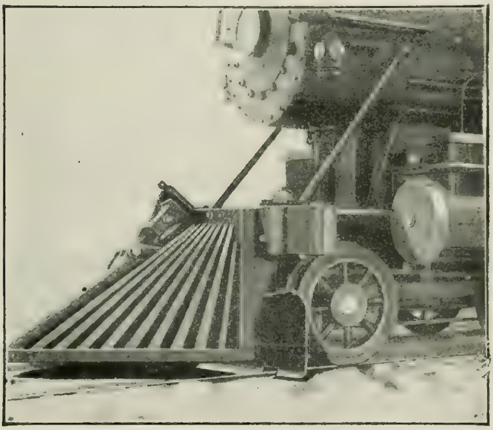

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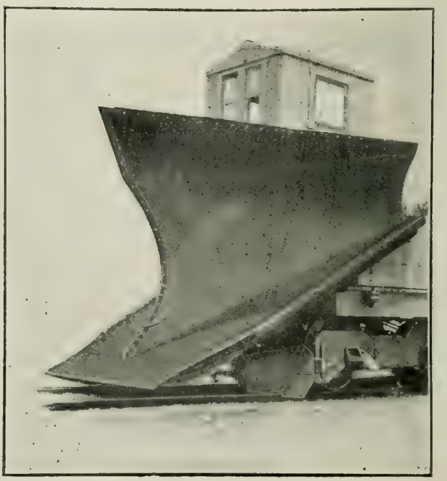

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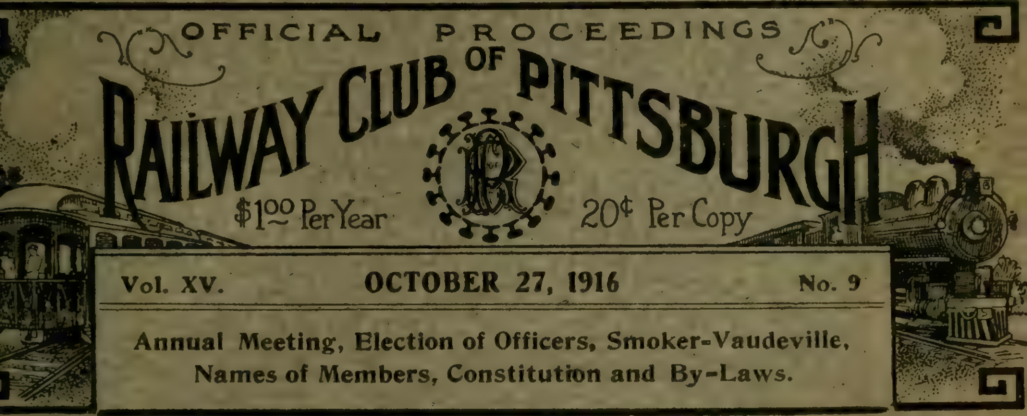

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Vol. XV. OCTOBER 27, 1916 No. 9

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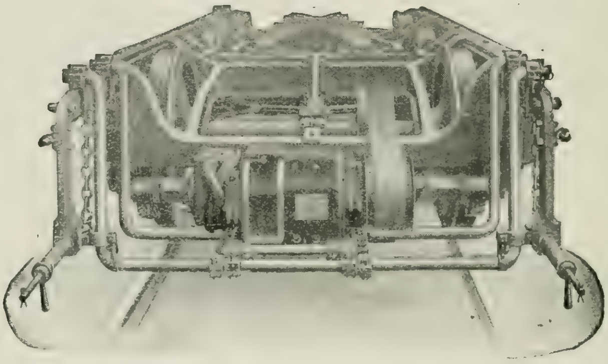

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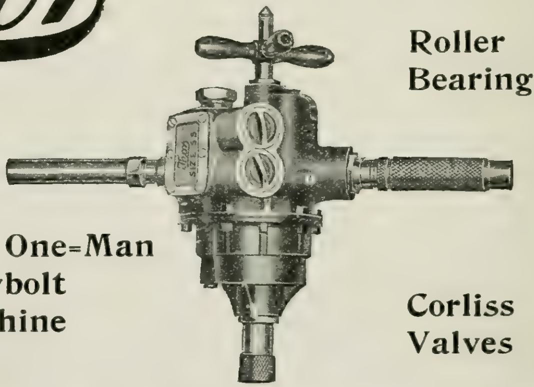

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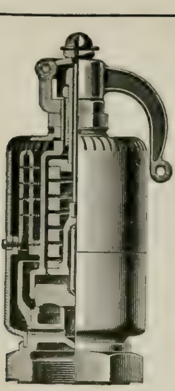

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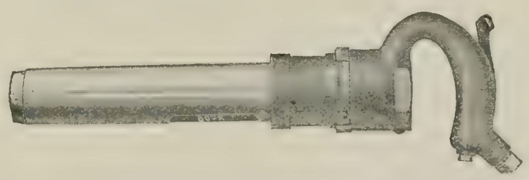

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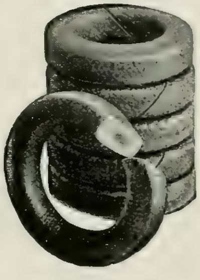

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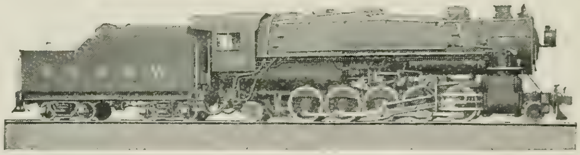

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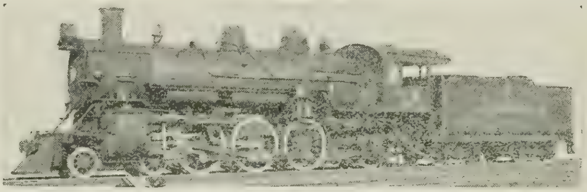

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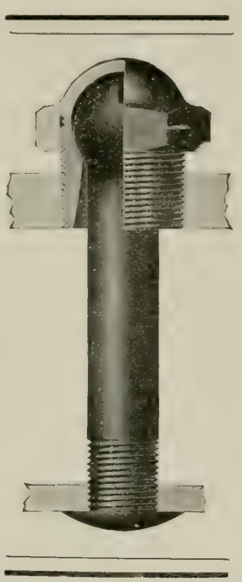

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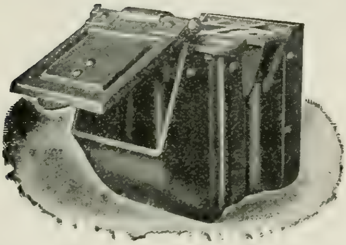

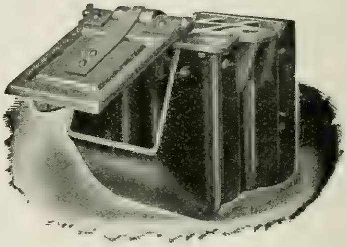

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Vol. XV. No. 9. Pittsburgh, Pa., Oct. 27, 1916. $1.00 Per Year 20c Per Copy

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* Deceased.

Meetings held fourth Friday of each month, except June, July and August.

PROCEEDINGS OF MEETING, OCTOBER 27, 1916.

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Rooney, E. S.
Sattley, E. C.
Schaff, A. J.
Schauer, A. J.
Scheck, H. G.
Schiller, John
Schultz, G. H.
Sewell, H. B.
Sheetz, E. S.
Sleeman, W. C.
Smead, D. N.
Smith, F. C.
Smith, M. DeK., Jr.
Snyder, R.
Snyder, F. I.
Stafford, B. E. D.
Stark, F. H.
Stucki, A.
Taylor, F. C.
Thomas, F. B.
Thomas, J. H.
Thurlby, A. R.
Tucker, J. L.
Turner, L. H.
Vowinkle, F. F.
Wegener, H.

Wilder, H. W.
Wilson, T. A.
Williamson, J. A.
Woernly, A. T.
Yungbluth, B. J.

VISITORS.

Alexander, E. E.
Alexander, L. F.
Anderson, George C.
Anderson, R.
Arnold, J. G.
Bell, A. O.
Buberich, H. W.
Bowers, J. M.
Boyle, K. J.
Brennan, E. J.
Cain, R. C.
Carr, George R.
Carr, W. K.
Carroll, J. T.
Casper, Harry
Coleman, H. J.
Crane, E. S.
Cunningham, Roy
Donaldson, D. B.
Doolin, C. H.
Durkin, J. E.
Edmiston, W. W.
Ekis, E. E.
Elder, Thos. W., Jr.
Elsey, R. G.
Emery, R. D.
Findlayson, Wm.
Fisher, H. W.
Fisher, J. W.
Flower, E. S.
Forrest, C. H.
Frey, A. R.
Garland, Robert
Geisler, J. J.
Geyer, H. L.
Gideon, F. A.
Gellinger, C. W.
Gipson, D. M.
Gray, J. E.
Grieve, Chas. N.
Guenhert, C. K.
Grimm, W.
Grimm, William
Haag, Chas. E.
Haugh, B. B.
Hagerty, J. W.
Hamilton, W. A.
Hamilton, R. H.
Hauser, G. L.
Helms, A. V.
Houser, H.
Jackson, Wm. E.
Joyce, E. T.
Kelly, Leo. J.
Kindle, W. F.
Kepp, R. H.
Kennedy, H. O.
Klein, Herbert
Knox, Earl
Kuhnert, C. A.
Ladd, George T.
Lafferty, Joseph A.
Lehman, A. C.
Leonard, E. J.
Lepper, C. W.
Lowar, W. J.
Lowery, Joseph
Lusk, R. W.
Lydon, J. J.
Manns, J. T.
Maser, W. L.
Mason, C. E.
Meyer, F. N.
Miller, G. H.
Morrison, W. F.
Munro, George
Myers, C. A.
McGinley, W. H.
McIntyre, R. C.
McNulty, Dr. R. M.
Nicholson, P. B.
Oaks, A. L.
O'Brien, Thos. J.
Parfitt, W.

Petty, H. W.
Pfeiffer, C. A.
Phillips, J. A.
Pickels, H. D.
Pugsley, W. F.
Rebstock, J. B.
Reed, W. D.
Regan, W. J.
Reymer, R. E.
Reynolds, D. E.
Rogers, William
Ross, W. S.
Rowley, C. E.
Roy, Bert
Stacer, F. J.
Saltic, Thomas
Scheeler, G.
Seil, H. H.
Shaw, W. G.
Sheasley, R. A.
Shirk, A. R.
Shering, C. M.
Spindler, D. G.
Streib, J. F.
Steck, F. A.
Steele, C. A.
Stenson, G. A.
Stewart, E. E.
Stillings, Wm. R.
Strasser, J. H.
Straw, E. F.
Sluten, F. L.
Styers, J. V.
Taylor, E. J.
Taylor, Joseph W.
Terwilliger, T. R.
Thomas, B. S.
Thomas, A.
Tunstall, Wm., Jr.
Trump, P. P.
Wibner, A. R.
Wilson, C. P.
Wilson, E. A.
Wilson, J. D.
Wilson, W. H.
Williams, H. S.
Wilt, C. H.
Zahniser, W. C.

The roll call was dispensed with, the attendance being recorded on the registry cards.

The reading of the minutes of the September meeting was dispensed with, the proceedings being in the hands of the printer and about ready for distribution to the members.

The Secretary read the following list of applicants for membership:

Armstrong, John L., Foreman Power Plant, Pennsylvania Lines West, 1241 Columbus Avenue, N. S., Pittsburgh, Pa. Recommended by R. C. Hettler.

Arnold, J. G., Car Service Clerk, Montour R. R., 8 Market Street, Pittsburgh, Pa. Recommended by F. H. Stark.

Arnold, J. J., Sales Department, Pressed Steel Car Co., Farmers Bank Building, Pittsburgh, Pa. Recommended by W. B. Rohn.

Brennan, E. J., Superintendent of Shops, B. & O. Ry., Glenwood, Pa. Recommended by J. B. Anderson.

Cox, A. J., Master Mechanic, LaBelle Iron Works, Steubenville, Ohio. Recommended by D. H. Amsbary.

Dittman, George, Roundhouse Foreman, P. & L. E. R. R., McKees Rocks, Pa. Recommended by J. A. Williamson.

Draper, Thomas, Manager, Draper Manufacturing Company, Port Huron, Mich. Recommended by F. M. McNulty.

Emery, R. W., Draftsman, Simplex Air Brake & Manufacturing Co., 36 East Forrest Street, Bellevue, Pa. Recommended by D. C. Courtney.

Flinner, John, Inspector of Air Brakes, P. & L. E. R. R., 740 Frederick Street, McKees Rocks, Pa. Recommended by R. M. Long.

Forrest, C. H., Foreman, P. & L. E. R. R., 503 Vulcan Street, McKees Rocks, Pa. Recommended by J. A. Williamson.

Frey, A. H., Draftsman, Pressed Steel Car Co., 3458 Fleming Avenue, N. S., Pittsburgh, Pa. Recommended by H. L. McFarland.

Gellinger, Chas. W., Representative Independent Pneumatic Tool Company, 1208 Farmers Bank Building, Pittsburgh, Pa. Recommended by R. T. Scott.

Haag, Chas. E., Storekeeper, P. & L. E. R. R., McKees Rocks, Pa. Recommended by C. W. Alleman.

Hansen, G. L., Draftsman, Pressed Steel Car Co., 120 S. Bryant Ave., Bellevue, Pa Recommended by Russell Graham.

Houser, Harry, Foreman, Electric Car Lighting, Pennsylvania R. R., 915 Eureka Street, Pittsburgh, Pa. Recommended by C. D. Caine.

Jackson, W. E., Passenger Agent, Pennsylvania R. R., 1002 Neal Street, West Homestead, Pa. Recommended by W. B. Lansberry.

Kennedy, N. B., Assistant Foreman Locomotive Shop, Carnegie Steel Co., Hays, Pa. Recommended by T. T. Copeland.

Lewis, H., Manager Purchases and Supplies, C. I. & W. R. R., Indianapolis, Ind. Recommended by J. G. Code.

Lower, N. M., Mechanical Engineer, Locomotive Stoker Co., Robinson and Darrah Streets, N. S., Pittsburgh, Pa. Recommended by L. E. Osborne.

Lucas, Daniel M., Foreman M. P. Department, P. & L. E. R. R., 3229 West Carson Street, McKees Rocks, Pa. Recommended by O. F. Braun.

Machen, Edward, General Car Foreman, P. C. C. & St. Louis Railway, Carnegie, Pa. Recommended by M. O'Connor.

Mackinney, Morgan, Assistant Storekeeper, P. & L. E. R. R., 4111 Penn Avenue, Pittsburgh, Pa. Recommended by J. A. Williamson.

Meyer, Chas. L., Lumber Foreman, P. & L. E. R. R., 3326 Brighton Road, Pittsburgh, Pa. Recommended by C. W. Alleman.

Miller, George H., Machinist, P. & L. E. R. R., 2932 Glasgow Street, Sheridan, Pittsburgh, Pa. Recommended by J. A. Williamson.

Morgan, David G., Superintendent Jones & Laughlin Company, 3935 Hoosac Street, Pittsburgh, Pa. Recommended by A. E. Herrold.

McIntyre, R. C., Locomotive Inspector, Carnegie Steel Co., 554 Frick Annex, Pittsburgh, Pa. Recommended by J. A. Ralston.

McMillan, A. E., Master Mechanic, B. & O. Railway, Glenwood, Pa. Recommended by J. B. Anderson.

Pearce, F. H., Draftsman, Pressed Steel Car Co., 405 Russellwood Avenue, McKees Rocks, Pa. Recommended by Russell Graham.

Race, John, Boiler Inspector, Carnegie Steel Company, 141 Chafant Street, Whitaker, Pa. Recommended by T. T. Copeland.

Schaich, R. F., Draftsman, Pressed Steel Car Co., 525 Marwood Avenue, McKees Rocks, Pa. Recommended by Russell Graham.

Schwegler, Henry, Foreman, Pennsylvania R. R., 129 Irving Avenue, Crafton, Pa. Recommended by I. D. Pratt.

Shirk, A. R., Assistant Engineer, W. P. Ter. Ry., Pittsburgh, Pa. Recommended by W. D. Lowe.

Smith, William J., Foreman Tin, Copper and Pipe Shop, Pennsylvania Lines West, 239 South Starr Avenue, Avalon, Pa. Recommended by R. C. Hettler.

Snyder, G. W., Principal Assistant Engineer, Pennsylvania R. R., Pennsylvania Station, Pittsburgh, Pa. Recommended by A. Stucki.

Spindler, David G., Locomotive Engineer, Union R. R., 632 Fourth Street, Braddock, Pa. Recommended by J. W. Wyke.

Stevenson, William, Foreman, P. & L. E. R. R., 509 Woodward Avenue, McKees Rocks, Pa. Recommended by O. F. Braun.

Stillings, William R., In charge of Locomotives, Carnegie Steel Company, 57 Elm Street, Sharon, Pa. Recommended by D. H. Amsbary.

Streib, J. F., Assistant Chief Engineer, Pressed Steel Car Co., Taylor Avenue, Avalon, Pa. Recommended by B. D. Lockwood.

Taylor, E. G., Master Mechanic, Simplex Air Brake Company, 36 East Forest Street, Bellevue, Pa. Recommended by D. C. Courtney.

Thorpe, E. S., Clerk, P. & L. E. R. R., McKees Rocks, Pa. Recommended by C. W. Alleman.

Wiley, Chas. M., Assistant Foreman, Pennsylvania Lines West, 1229 Pennsylvania Avenue, N. S., Pittsburgh, Pa. Recommended by R. C. Hettler.

Wilkoff, L. C., Secretary, Youngstown Steel Car Co., Youngstown, Ohio. Recommended by A. Stucki.

Williams, H. S., Stenographer, Pressed Steel Car Co., 99 South Grant Street, Bellevue, Pa. Recommended by Russell Graham.

PRESIDENT McNULTY: As soon as these applicants have been favorably passed upon by the Executive Committee they will become members without further action except the payment of dues for the first year.

We will now listen to the Annual Report of the Secretary.

Pittsburgh, Pa., October 27, 1916.

To the Officers and Members of
The Railway Club of Pittsburgh

GENTLEMEN:

I beg to submit a statement of some of the events closing the fifteenth year of the Club.

During the year death has removed from our midst the following members: William Wittig, H. J. Shook, Harry B. Hunt, J. J. Toomey, Will H. Rowand, S. R. Wilson, J. M. James and F. Zinsmaster.

The following is a summary of the membership, financial condition, etc. for the year up to and including this meeting:

MEMBERSHIP

Reported last year	1025	
Received into membership during the year	67	
Reinstated	6	
		1098
Suspended for non-payment of dues	141	
Resigned	50	
Loss of address	18	
Removed by death	8	217
Present membership		881

FINANCIAL

RECEIPTS

In hands of Treasurer last year	$2,196.43	
From dues	2,133.00	
From advertising	1,914.36	
From sale of Proceedings, Smoker tickets, etc.	249.07	
From Alvin Theater party(The Only Girl)	3,894.00	
Interest on Savings account ($3,198.35)	82.82	
Interest on checking account	16.22	
Total Receipts		$10,485.90

DISBURSEMENTS

Printing Proceedings, Advance sheets, Notices of meetings, Postage	$2,378.23
Hall rent, Lunches and Cigars for meetings of Club	647.70

Premium on Bonds, Secretary and Treasurer	17.50	
Secretary's Expenses, M. C. B. and M. M. Convention	50.00	
Stereopticon light for illustrating papers	30.00	
Office stationery and supplies	115.35	
Entertainment of members and guests	466.15	
Reporting proceedings of meetings	120.00	
Secretary's salary and expenses of advertising, year ending October, 1916	791.43	
Messenger service	18.00	
Assessment, Society of Railway Club Secretaries and Society of Technical Associations Secretaries	25.00	
Contribution to Relief Fund for Jewish sufferers	50.00	
Alvin Theater party	1,735.97	
Total disbursements		$ 6,445.33
Balance on hand		$ 4,040.57

Respectfully submitted,
J. B. Anderson,
Secretary.

Approved:
L. H. Turner,
D. J. Redding,
F. R. McFeatters,
A. G. Mitchell,
Executive Committee.

PRESIDENT McNULTY: We will now hear the Annual Report of the Treasurer.

Pittsburgh, Pa., October 27, 1916.

To the Officers and Members of
The Railway Club of Pittsburgh

Gentlemen:

I beg to submit the following report for the year ending October 27, 1916:

Receipts

Balance on hand last year	$2,196.43
Received from the Secretary during the year	8,190.43

Interest on Savings account	82.82	
Interest on Checking account	16.22	
Total		$10,485.90

DISBURSEMENTS

Paid out on Secretary's vouchers	$ 6,445.33
Balance on hand October 27, 1916	$ 4,040.57

Respectfully submitted,

F. H. Stark,
Treasurer.

Approved:
L. H. Turner,
D. J. Redding,
F. R. McFeatters,
A. G. Mitchell,
Executive Committee.

PRESIDENT McNULTY: The reports of the Secretary and Treasurer will be referred to the Executive Committee for audit and approval.

We will now hear the report of the Executive Committee on the election of Officers:

MR. D. J. REDDING: On behalf of the Committee I wish to submit the following report:

There were a total of 234 votes cast unanimously electing the following Officers to serve this Club for the year beginning November 1, 1916.

President—J. G. Code, General Manager, Wabash-Pittsburgh Terminal Railway.

First Vice-President—H. H. Maxfield, Superintentdent Motive Power, Pennsylvania Railroad.

Second Vice-President—D. M. Howe, Manager Joseph Dixon Crucible Company.

Secretary—J. B. Anderson, Chief Clerk to Superintendent Motive Power, Pennsylvania Railroad.

Treasurer—F. H. Stark, General Superintendent, Montour R. R.

Executive Committee:

L. H. Turner, Supt. Motive Power, P. & L. E. R. R.
D. J. Redding, Asst. Supt. Motive Power, P. & L. E. R. R.
F. R. McFeatters, Sunperintendent,Union R. R.
A. G. Mitchell, Superintendent, Pennsylvania Railroad.
F. M. McNulty, Supt. Motive Power, Monon. Conn. R. R.

Finance Committee:

Stephen C. Mason, Secretary, The McConway & Torley Co.
E. K. Conneely, Asst. to Vice-President, P. & L. E. R. R.
Chas. Lindstrom, Asst. to President, Pressed Steel Car Co.
L. C. Bihler, Traffic Manager, Carnegie Steel Co.
Walter V. Turner, Asst. Mgr., Westinghouse Air Brake Co.

Membership Committee:

Frank J. Lanahan, President, Fort Pitt Malleable Iron Co.
A. Stucki, Engineer.
C. O. Dambach, Supt, Wabash-Pittsburgh Terminal R. R.
Harry Howe, Inspector, Pressed Steel Car Co.
R. L. Kleine, General Car Inspector, Pennsylvania R. R.
B. E. D. Stafford, General Manager, Flannery Bolt Co.
Samuel Lynn, Master Car Builder, P. & L. E. R. R.

Entertainment Committee:

D. H. Amsbary, District Manager, Dearborn Chemical Co.
Harry Murdoch, President, H. Murdoch & Co.
E. C. Sattley, General Mgr., Page Woven Wire Fence Co.

PRESIDENT McNULTY: I know you will all be interested in hearing from the gentlemen whom you have elected to office. I will therefore call on the President-elect, Mr. J. G. Code, General Manger Wabash-Pittsburgh Terminal Railway.

MR. J. G. CODE: Mr. President and fellow-members of the Railway Club of Pittsburgh:—I believe the President was thinking about me when he inadvertently spoke of the minutes as being in the hands of the Receiver instead of the printer. Thanks to the foresight and energy and devotion of my predecessors, from that Grand Old Man L. H. Turner down to our Grand Young Man, Mr. McNulty, to say nothing of their associates in the work, we have a railway club which in its usefulness is seocnd to none in the country. It is an honor to be a member of this Club, and therefore a very high honor to preside over its deliberations. I thank you for the honor conferred upon me.

I would like to call the attention of all the members of the Club, and more particularly the younger members, to the Proceedings of the last regular meeting, which will reach you in a few days, and to ask that you read carefully the address of Mr. Basford and the discussion presented by Mr. L. H. Turner, Mr. Roy V. Wright, Mr. Walter V. Turner and others, for you will find there every incentive for the young men to take an active interest in the deliberations and in the meetings of this Club. We hope with your cooperation to continue during the coming year the progress which has characterized the history of the Club. Again I thank you, gentlemen.

PRESIDENT McNULTY: Mr. H. H. Maxfield, Superintendent of Motive Power, P. R. R., the First Vice-President elect, we would be pleased to hear from him.

MR. H. H. MAXFIELD: Mr. President and gentlemen: I haven't much to say except that I am certainly pleased and gratified to be elected to this office and I shall endeavor to do everything possible to make the activities of the Club successful during the coming year. I know we have a man as President who will make things hum, and I think if we all do our part we will have one of the best years this Club has ever had.

PRESIDENT McNULTY: Mr. D. M. Howe, the Second Vice-President elect. I take pleasure in introducing Mr. Howe.

MR. D. M. HOWE: Mr. President and gentlemen:—I consider it a high honor to be elected a Vice-President of this splendid organization, as the Nominating Committee stepped from the well trodden path of nominating only railway officials, when they come to select a supply man and made him your Second Vice-President. I certainly do appreciate this honor. But I want to say that if the Nominating Committee thought that my nomination and election as Second Vice-President would induce me to cease my activities on behalf of this Club, they are very much mistaken indeed, for I would much rather hand back the honor from whence it came than to cease my activities. I certainly thank you for the honor conferred upon me.

PRESIDENT McNULTY: Mr. J. B. Anderson, whom you have reelected Secretary.

MR. J. B. ANDERSON: Mr. President, I want to assure you of the cooperation which has been given me as Secretary during the past five years and to further assure you that everything which I can do as Secretary to help will be done cheerfully to promote the progress of this Club. We have been ably assisted during the past year by our officers and members as well, and you may surely count on a continuance of that loyal support.

There is one thing I would like to emphasize and that is the number of members suspended for nonpayment of dues the past year. Two years ago we had a total membership of over a thousand and today we have gone back to 881. Whether it is due to just a little carelessness on the part of our membership in the payment of dues I am unable to say, but I hope that in the coming year our membership will greatly increase without any loss from the failure of members to keep up their dues.

PRESIDENT McNULTY: Mr. F. H. Stark, who has been reelected Treasurer.

MR. F. H. STARK: Mr. President and gentlemen, I thank you for the honor you have conferred upon me, and through the backing of the bonding company I trust your funds will be safe.

PRESIDENT McNULTY: We have three newly elected officers from whom I know you would like to hear, Mr. B. E. D. Stafford, Mr. E. C. Sattley and Mr. Harry Murdoch.

MR. B. E. D. STAFFORD: Mr. President and fellow-members, I appreciate the honor indeed that has been bestowed upon me and I hope that I may be somewhat valuable in my capacity as one of the Membership Committee and I trust we may be able to boost the membership and make it a little more substantial.

I have always been very much interested in this Club and I will do my utmost in any way I can to forward its interests. It is a great club.

MR. E. C. SATTLEY: Mr. President and fellow-members, as a member-elect of the Entertainment Committee I can only refer to the word of Scripture which says something to the effect that by their deeds ye shall know them. We hope to please you.

PRESIDENT McNULTY: Mr. Harry Murdoch seems to have side-stepped. Is there any further business to be brought before the Club at this time?

MR. D. J. REDDING: Mr. Retiring President, and Members of the Railway Club of Pittsburgh, I come now to a sad and yet a pleasant duty. It has been our custom when a president comes to the end of his term and retires to the dusty shelf of the Executive Committee, where he is relegated to the back numbers and no longer stands in the blazing light of the front rank, to give him something that will remind him of the time when he was panoplied with honor and the leading light in this association, so that he and his family, to generations yet unborn, may be able to point with pride to the fact that their ancestor once served the Railway Club of Pittsburgh, and served it well and faithfully, and that we, as members of this Club, appreciated his efforts and in a small way tried to give material expression of that appreciation.

Not that we ever could reward the President adequately for his services, but that he may know, and have something ever to remind him of the fact that we recognize and appreciate his service, we take pleasure in presenting to Mr. McNulty at this time, this beautiful and complete set of silver table ware, which we hope will remain in his family for all time to come.

PRESIDENT McNULTY: Gentlemen and friends, you all know that I am not much of a speech maker. I have been interested in this Club since its organization and have always taken an active part, as far as I could, in trying to increase its membership and further its interests, and I expect to continue to do so, as long as I am permitted to remain a member of the Club. I want to thank the officers and members of the Club for this beautiful gift and to assure you that my family and I will appreciate and take pride in this beautiful remembrance, as long as we live. I sincerely thank you.

Is there any further business? If not, before we go to the programme of entertainment, which the Committee has provided, we are honored by the presence of Mr. Robert Garland, President of the Chamber of Commerce of Pittsburgh, and we would be glad, if he would accept the privilege of the floor for a few moments.

It is my pleasure to introduce to you Mr. Garland.

MR. ROBERT GARLAND: Representing the Chamber of Commerce I want to say that I am very glad to be here, because in our Chamber we have some very good railway men as well as friends of the railroads generally. Mr. R. L. O'Donnel is vice-president of the Chamber, Mr. J. B. Yohe is a Director and we have on the Board as well Frank J. Lanahan, who is Chairman of our Convention Committee and a live wire, Charles J. Graham and some others of your good members.

I just want to say that the Chamber of Commerce is trying to help Pittsburgh in every respect. It is always conservative. It is not opposed to the railrods as such, we always try to do what is right for the interest of the entire city. We are trying to make the city of Pittsburgh a Convention City. With the advent of the William Penn Hotel we are able to take care of a convention of any size. That helps the railroads for it tends to bring many people to Pittsburgh. With the William Penn Hotel and the Exposition buildings for purposes of exhibition we can take care of large conventions and we aim to put Pittsburgh on the map as a Convention City. That brings considerable money to Pittsburgh which is spent in the theatres, department stores and other such places and this also means additional business for the transportation interests. Take the Master Car Builders Association for instance, which generally means an attendance of about three thousand men. we can now take care of them in Pittsburgh. We could not have done it a year ago. We intend to go after these conventions and the Chamber of Commerce is spending money along this line. The Chamber has appropriated to Mr. Lanahan as Chairman $1,000 and will give him more money as needed to make Pittsburgh a Convention City.

We also, as you know, are about to start a membership campaign. You have one on all the time, but we are about to start a special effort to get a thousand new members in order that we may go into our new building, now being erected on the corner of Smithfield and Seventh Avenue, in proper shape.

We are doing what we can for the city of Pittsburgh and we are closely related to the Railway Club through its prominent men who are on our Board and among the Officers of our Association.

It is not my intention to impose a long speech on you in any way. I came here not expecting to be called on. My friend, Charlie Rea, asked me to come over and have a smoke and a good time but he did not even intimate that I was to be favored with a place on the programme. I thank you most cordially for your courtesy and hope you will have the greatest prosperity in the year to come under your new management.

PRESIDENT McNULTY: Is there anything further to be brought before the Club at this time? If not, we will turn over the balance of the evening's programme to the Entertainment Committee under the guidance of Mr. D. H. Amsbary. We all know what he can do in the way of entertaining us.

The following programme was then presented and was received with much pleasure, after which luncheon was served in the dining room.

ENTERTAINMENT PROGRAMME.

No. 1. MOVING PICTURE (Taken at Pittsburgh Field Club)

No. 2. SONG BIRD - - - - Adelaide Meehan

No. 3. THE GERMAN SENATOR - - Paul Paulat
Address on the Eight Hour Law

No. 4. THE HIGHLAND QUARTETTE - -
- - Gene Locklin, Burt Mustin, Glen Morse, Jess Young

No. 5. THE GIRL WITH THE EDUCATED FEET -
- - - - - Ola Edeburn

No. 6. IN HOT STUFF - - Oldman & Herman
Charlie Pauline
Courtesy of Reymer Bros.

No. 7. MOVIE

At the close of the programme of entertainment, a rising vote of thanks was unanimously extended to the Entertainment Committee.

J. B. Anderson
Secretary.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Official Proceedings—The Railway Club of Pittsburgh published monthly, except June, July and August at Pittsburgh, Pennsylvania, for October 1st, 1916.

State of Pennsylvania }
County of Allegheny } *ss.*

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. B. Anderson, Secretary, who, having been duly sworn according to law, deposes and says that he is the Editor and Publisher of the Official Proceedings—The Railway Club of Pittsburgh, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, J. B. Anderson, Secretary, 207 Pennsylvania Station, Pittsburgh, Pa.

Editor, J. B. Anderson, Secretary, 207 Pennsylvania Station, Pittsburgh, Pa.

Managing Editor, (None).

Business Managers, (None).

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

The Railway Club of Pittsburgh, 207 Pennsylvania Station, Pittsburgh, Pa.; President, F. M. McNulty, Superintendent Motive Power, Monongahela Conn. R. R., Pittsburgh, Pa.; Secretary, J. B. Anderson, Chief Clerk to Superintendent Motive

Power, Pennsylvania Railroad, Pittsburgh, Pa.; Treasurer, F. H. Stark, General Superintendent, Montour R. R., Coraopolis, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

(None)

J. B. ANDERSON,
Signature of editor, publisher.

Sworn to and subscribed before me this 2nd day of October, 1916.

F. D. ECKER,
[SEAL] *Notary Public.*

My commission expires January 15, 1917.

CONSTITUTION

ARTICLE I.

The name of this organization shall be "The Railway Club of Pittsburgh."

ARTICLE II.

OBJECTS.

The objects of this Club shall be mutual intercourse for the acquirement of knowledge, by reports and discussion, for the improvement of railway operation, construction, maintenance and equipment, and to bring into closer relationship men employed in railway work and kindred interests.

ARTICLE III.

MEMBERSHIP.

SECTION 1. The membership of this Club shall consist of persons interested in any department of railway service or kindred interests, or persons recommended by the Executive Committee upon the payment of the annual dues for the current year.

SEC. 2. Persons may become honorary members of this Club by a unanimous vote of all members present at any of its regular meetings, and shall be entitled to all the privileges of membership and not be subject to the payment of dues or assessments.

ARTICLE IV.

OFFICERS.

The officers of this Club shall consist of a President, First Vice-President, Second Vice-President, Secretary, Treasurer, Finance Committee consisting of five members, Membership Committee consisting of seven members, Entertainment Committee consisting of three members, and an Elective Executive Committee of three or more members who shall serve a term of one year from the date of their election, unless a vacancy occurs, in which case a successor shall be elected to fill the unexpired term.

ARTICLE V.

DUTIES OF OFFICERS.

SECTION 1. The President shall preside at all regular or special meetings of the Club and perform all duties pertaining to a presiding officer; also serve as a member of the Executive Committee.

SEC. 2. The First Vice-President, in the absence of the President, will perform all the duties of that officer; the Second Vice-President, in the absence of the President and First Vice-President, will perform the duties of the presiding officer. The First and Second Vice-President shall also serve as members of the Executive Committee.

SEC. 3. The Secretary will attend all meetings of the Club or Executive Committee, keep full minutes of their proceedings, preserve the records and documents of the Club, accept and turn over all moneys received to the Treasurer at least once a month, draw cheques for all bills presented when approved by a majority of the Executive Committee present at any meetings of the Club, or Executive Committee meeting. He shall have charge of the publication of the Club Proceedings and perform other routine work pertaining to the business affairs of the Club under the direction of the Executive Committee.

SEC. 4. The Treasurer shall receipt for all moneys received from the Secretary, and deposit the same in the name of the Club within thirty days in a bank approved by the Executive Committee. All disbursements of the funds of the Club shall be by cheque signed by the Secretary and Treasurer.

SEC. 5. The Executive Committee will exercise a general supervision over the affairs of the Club and authorize all expenditures of its funds. The elective members of this Committee shall also perform the duties of an auditing committee to audit the accounts of the Club at the close of a term or at any time necessary to do so.

SEC. 6. The Finance Committee will have general supervision over the finances of the Club, and perform such duties as may be assigned then by the President or First and Second Vice-Presidents.

SEC. 7. The Membership Committee will perform such duties as may be assigned them by the President or First and

Second Vice-Presidents, and such other duties as may be proper for such a committee.

Sec. 8. The Entertainment Committee will perform such duties as may be assigned them by the President or First and Second Vice-Presidents and such other duties as may be proper for such a committee.

ARTICLE VI.

ELECTION OF OFFICERS.

Section 1. The officers shall be elected at the regular annual meeting as follows, except as otherwise provided for:

Sec. 2. Printed forms will be mailed to all the members of the Club, not less than twenty days previous to the annual meeting, by the elective members of the Executive Committee. These forms shall provide a method, so that each member may express his choice for the several offices to be filled.

Sec. 3. The elective members of the Executive Committee will present to the President the names of the members receiving the highest number of votes for each office, together with the number of votes received.

Sec. 4. The President will announce the result of the ballot and declare the election.

Sec. 5. Should two or more members receive the same number of votes, it shall be decided by a vote of the members present, by ballot.

ARTICLE VII.

AMENDMENTS.

Amendments may be made to this Constitution by written request of ten members, presented at a regular meeting and decided by a two-thirds vote of the members present at the next regular meeting.

BY-LAWS

ARTICLE I.

MEETINGS.

Section 1. The regular meetings of the Club shall be held at Pittsburgh, Pa., on the fourth Friday of each month, except June, July and August, at 8:00 o'clock P. M.

Sec. 2. The annual meeting shall be held on the fourth Friday of October each year.

Sec. 3. The President may, at such times as he deems expedient, or upon request of a quorum, call special meetings.

ARTICLE II.

QUORUM.

At any regular or special meeting nine members shall constitute a quorum.

ARTICLE III.

DUES.

Section 1. The annual dues of members shall be Two dollars, One dollar of which to provide light refreshments for each meeting, payable in advance on or before the fourth Friday of September each year.

Sec. 2. The annual subscription to the printed proceedings of the Club shall be at the published price of One Dollar.

Sec. 3. At the annual meeting members whose dues are unpaid shall be dropped from the roll after due notice mailed them at least thirty days previous.

Sec. 4. Members suspended for non-payment of dues shall not be reinstated until all arrearages have been paid.

ARTICLE IV.

ORDER OF BUSINESS.

1—Roll call.

2—Reading of the minutes.

3—Announcements of new members.

4—Reports of Committees.
5—Communications, notices, etc.
6—Unfinished business.
7—New business.
8—Recess.
9—Discussion of subjects presented at previous meeting.
10—Appointment of committees.
11—Election of officers.
12—Announcements.
13—Financial reports or statements.
14—Adjournment.

ARTICLE V.

SUBJECTS—PUBLICATIONS.

SECTION 1. The Executive Committee will provide the papers or matter for discussion at each regular meeting.

SEC. 2. The proceedings or such portion as the Executive Committee may approve shall be published (standard size, 6x9 inches), and mailed to the members of the Club or other similar clubs with which exchange is made.

ARTICLE VI.

The stenographic report of the meetings will be confined to resolutions, motions and discussions of papers unless otherwise directed by the presiding officer.

ARTICLE VII.

AMENDMENTS.

These By-Laws may be amended by written request of ten members, presented at a regular meeting, and a two-thirds vote of the members present at the next meeting.

RAILWAY CLUB NOTES.

The following subjects were presented and discussed by the several Railway Clubs during the month of October, 1916, as noted below:

New York Railroad Club, Harry D. Vought, Secretary,
95 Liberty Street, New York, N. Y.

SUBJECT—"Education of Young Men to Fit Them for Promotion" by F. W. Thomas.

New England Railroad Club, Wm. E. Cade, Jr., Secretary,
683 Atlantic Avenue, Boston, Mass.

SUBJECT—"Fuel Economy and Boiler Design" by J. T. Anthony.

Canadian Railway Club, Jas. Powell, Secretary,
P. O. Box 7, St. Lambert, near Montreal, Can.

SUBJECT—"Railway Publicity" by W. S. Thompson.

Richmond Railway Club, F. O. Robinson, Sec'y, Richmond, Va.

SUBJECT—"Fire Box Efficiency" by J. T. Anthony.

St. Louis Railway Club, B. W. Frauenthal, Secretary,
Union Station, St. Louis, Mo.

SUBJECT—"The Ubiquitous Freight Car Question and Its Elusive Answer" by E. H. DeGroot, Jr.

Southern & South Western Ry. Club, A. J. Merrill, Secretary,
Box 1205, Atlanta, Ga.

SUBJECT—"Fire Prevention."

Central Railway Club, Buffalo, N. Y., Harry D. Vought,
Secretary, 95 Liberty Street, New York, N. Y.

SUBJECT—(No Meeting).

The Railway Club of Pittsburgh, J. B. Anderson, Secretary,
207 Penna. Station, Pittsburgh, Pa.

SUBJECT—Annual Meeting.

Copies of the above papers can be had upon application to the Secretary at the address given for a nominal price.

In Memoriam

F. ZINSMASTER

Died October 5, 1916

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Alleman, C. W.,
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Alliance, Ohio.

Allen, Jas. P.,
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Allison, John,
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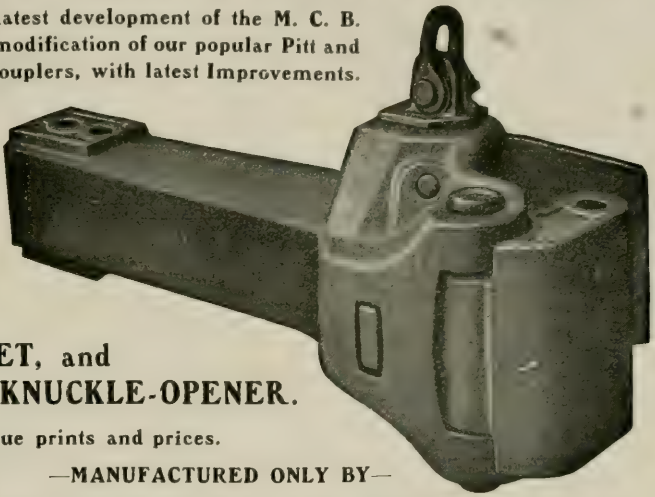

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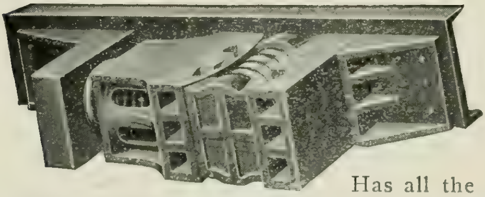

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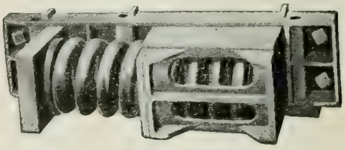

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